

Tec 6 Plus Vaporizer

Operation and Maintenance Manual

User Responsibility

This Product will perform in conformity with the description thereof contained in this operating manual and accompanying labels and/or inserts, when assembled, operated, maintained, and repaired in accordance with the instructions provided. This Product must be checked periodically. A defective Product should not be used. Parts that are broken, missing plainly worn, distorted, or contaminated should be replaced immediately. Should repair or replacement become necessary, Datex-Ohmeda recommends that a telephonic or written request for service advice be made to the nearest Datex-Ohmeda Field Service Support center. This Product or any of its parts should not be repaired other than in accordance with written instructions provided by Datex-Ohmeda and by Datex-Ohmeda trained personnel. The Product must not be altered without the prior written approval of Datex-Ohmeda's Quality Assurance Department. The user of this Product shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, improper repair, damage, or alteration by anyone other than Datex-Ohmeda.

⚠ Caution U.S. Federal and Canadian law restrict this device to sale by or on the order of a licensed medical practitioner. Outside the U.S.A. and Canada, check local laws for any restriction that may apply

Datex-Ohmeda products have unit serial numbers with coded logic which indicates a product group code. The year of manufacture and a sequential unit number for identification.

AAA A 12345



This alpha character indicates the year of product manufacture and when the serial number was assigned; "C" = 1999, "D" = 2000, "E" = 2001, etc. "I" and "O" are not used.

Introduction

In this section	
What this manual includes	1-2
Precautions	1-3
Symbols	1-4

What this manual includes

Important

This manual contains the information required to install, operate and maintain both the Datex-Ohmeda and the North American Dräger variants of the Tec 6 Plus Vaporizer. All of the graphics illustrated in this manual show the Datex-Ohmeda variant, unless the procedure differs for the North American Dräger variant.

Section 1 tells you how to use this manual and supplies information about the symbols used on the equipment.

Section 2 provides functional descriptions and theory of operation for the major components.

Section 3 describes all the controls and indicators on the vaporizer.

Section 4 tells you how to mount the vaporizer on a manifold.

Section 5 provides operating instructions, including a preoperative checkout and instructions for filling the vaporizer.

Section 6 provides maintenance instructions, including cleaning the vaporizer and a list of spare parts. Maintenance procedures are restricted to those detailed in this manual.

Section 7 provides the theory of operation for the alarm and indicator display and vaporizer delivery system.

Section 8 provides information for troubleshooting the vaporizer.

Section 9 contains specifications for the vaporizer.

Section 10 contains the warranty.

Section 11 contains Datex-Ohmeda's servicing policy.

Requests for servicing facilities, advice or assistance must be addressed either to a local Datex-Ohmeda office or to a Datex-Ohmeda Authorized Distributor.

Datex-Ohmeda strongly recommends that you keep all relevant documentation, including this manual and accompanying labels, immediately available to all users.

Precautions

⚠ WARNING

Do not fill the vaporizer with any substance other than Suprane™ (desflurane) as specified on the front label. If any substance other than Suprane™ (desflurane) is used, patient injury could occur.

U.S. Federal and Canadian law restrict this device to sale by or on the order of a licensed medical practitioner. Outside the U.S.A. and Canada, check local laws for any restrictions that may apply.

Before using the Tec 6 Plus Vaporizer, you must be familiar with the Suprane™ (desflurane) package insert. Failure to conform to the recommendations on the insert can result in patient injury.

Do not attempt to use a vaporizer that has been dropped. A dropped vaporizer MUST be sent to the nearest Datex-Ohmeda Field Operations Unit for servicing. See Section 11 for complete shipping instructions.

Do not use malfunctioning equipment. Make all necessary repairs or have the equipment serviced by an authorized Datex-Ohmeda service center. After repair, test the equipment to ensure that it is functioning properly, in accordance with the manufacturer's published specifications.

Important:

European Standard EN 740 - *Anesthetic Workstations and Their Modules* requires that an appropriate gas monitor is used to monitor the concentration of anesthetic agent vapor in the inspiratory gas when the vaporizer is in operation in order to provide protection against hazardous output in the event of a device malfunction.

Datex-Ohmeda strongly recommends the use of anesthesia gas monitoring with this equipment. Refer to local standards for mandatory monitoring.

Symbols

Warnings and Cautions tell you about dangerous conditions that can occur if you do not follow all instructions in this manual.

⚠ WARNING Warnings tell about a condition that can cause injury to the operator or the patient.

⚠ CAUTION Cautions tell about a condition that can cause damage to the equipment. Read and follow all warnings and cautions.

Symbol	Location	Meaning
○	Control Dial	Standby setting
●	Interlock Block	Setting mark - dial marking alignment point for required setting
▽	Interlock Block	Equi-potential stud - connection for minimizing electrical potential difference
🔇	Front Panel	Auditory alarm mute button
◀	Display Panel	240 ml refill mark - indicates that an additional 240 ml of agent can be added
█	Display Panel	Symbolizes nominal agent level display when 390 ml of agent in sump (max.)
█	Display Panel	Symbolizes agent level display when 60 ml or more of agent in sump (min.)
~	Rear Label	AC electrical supply must be single phase sinusoidal alternating current. The voltage requirement for the vaporizer appears on this label.
做人图标	Rear Label	The degree of protection against electric shock is Type B
→	Top Plate Label	Direction of flow
!	Various	Warning
!	Various	Caution



Systems with this mark agree with the European Council Directive (93/42/EEC) for Medical Devices when they are used as specified in their Operation and Maintenance manuals. The xxxx is the certification number of the Notified Body used by Datex-Ohmeda's Quality Systems.

Description

In this section

What is a Tec 6 Plus Vaporizer?	2-2
Components	2-6
Power supply unit	2-6
Filler assembly	2-6
Drain plug	2-7
Power cord and battery	2-7
Equi-potential stud	2-8
Sump	2-8
Heater elements	2-8
Sensors	2-8
Agent level sensor	2-9
Tilt switch	2-9

What is a Tec 6 Plus Vaporizer?

The Tec 6 Plus Vaporizer adds Suprane™ (desflurane) inhalant anesthetic vapor to the medical gasses supplied to a patient. The Datex-Ohmeda vaporizer should be used in anesthesia systems equipped with a Selectatec® Series Manifold only.

The North American Dräger vaporizer should be used in anesthesia systems equipped with an exclusion manifold. Both variants of the Tec 6 Plus Vaporizer must be supplied with dry medical gas and be connected to a suitable AC power supply.

The Tec 6 Plus Vaporizer is designed to meet UL 2601-1, EN 60601-1 and IEC 601-2-13.

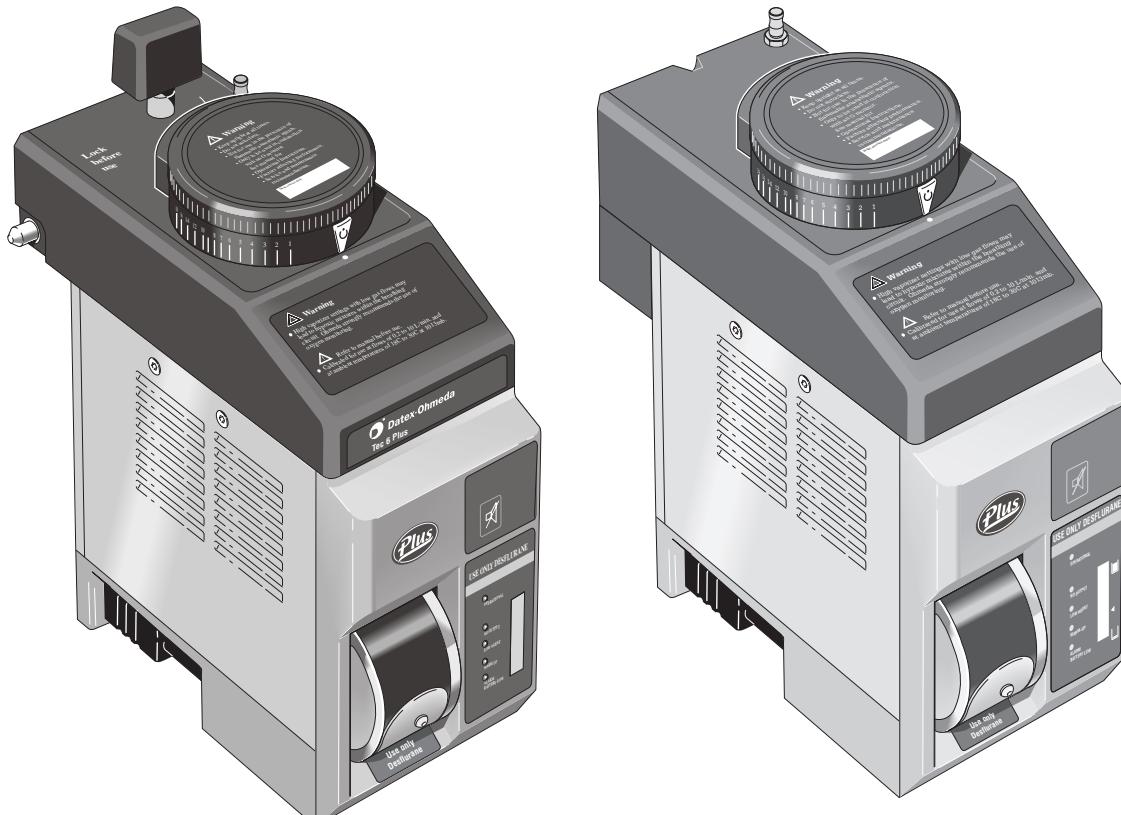


Figure 1-1 • Tec 6 Plus Vaporizer, Datex-Ohmeda variant (left), and North American Dräger variant (right)

Mechanical and electrical interlocks incorporated into the vaporizer help to ensure that:

- The vaporizer dial can only be turned from \textcircled{O} (Standby) when the vaporizer is locked onto the manifold and the green OPERATIONAL light is illuminated to indicate that the vaporizer has attained the correct operating temperature.
- Only one vaporizer can be operated at a time.
- The gas flow only enters the selected vaporizer.
- Unwanted anesthetic trace vapor is minimized after the vaporizer is turned to \textcircled{O} (Standby).

Important:

European Standard EN 740 - *Anesthetic Workstations and Their Modules* requires that an appropriate gas monitor is used to monitor the concentration of anesthetic agent vapor in the inspiratory gas when the vaporizer is in operation in order to provide protection against hazardous output in the event of a device malfunction.

Datex-Ohmeda strongly recommends the use of anesthesia gas monitoring with this equipment. Refer to local standards for mandatory monitoring.

⚠ WARNING

This manual and its associated documentation must be studied before any attempt is made to install, operate or clean any part of the Tec 6 Plus Vaporizer.

The performance of the anesthesia machine and vaporizer can be degraded if the machine and vaporizer are mismatched.

To avoid explosive hazards, flammable anesthetic agents such as Ether and Cyclopropane must not be used in this vaporizer. Only anesthetic agents which comply with the requirements for non-flammable anesthetic agents in the IEC 601-2-13 Standard, particular requirements for the safety of anesthesia machines, are suitable for use in the presence of this vaporizer.

As this vaporizer is not suitable for use with flammable anesthetic agents such as Ether or Cyclopropane, the use of antistatic breathing tubes and face masks is not necessary. The use of antistatic or electrically conductive breathing tubes when utilizing high frequency electric surgery equipment may cause burns and is therefore not recommended in any application of this vaporizer.

The functioning of this vaporizer can be adversely effected by the operation of equipment such as high frequency surgical apparatus or short-wave therapy equipment in the vicinity.

Do not operate the vaporizer other than with dry medical gases.

The Tec 6 Plus Vaporizer must not be used in a Magnetic Resonance Imaging environment.

The functioning of this Tec 6 Plus Vaporizer can be adversely affected by electromagnetic interference exceeding the levels specified in EN 60601-1-2.

This product contains a small quantity of Mercury in the tilt switch mechanism and should be disposed of according to local regulations.

Do not attempt to use a vaporizer that has been dropped. A dropped vaporizer MUST be sent to the nearest Datex-Ohmeda Field Operations Unit for servicing. See Section 11 for complete shipping instructions.

⚠ CAUTION	Description
	<p>If the vaporizer is not likely to be used for a period of 12 months, remove the battery. Failure to do so can result in damage to the vaporizer. The battery must be placed back into the vaporizer before use.</p> <p>A 'No Output' alarm could be caused by downstream high frequency ventilation at greater than 60 breaths/min with an airway pressure of 100cm H₂O or pulsing the O₂ flush faster than 1 pulse/sec over a time period of greater than 10 seconds.</p>

Components

Power supply unit

The Tec 6 Plus Vaporizer operates from a 100 to 120VAC 50/60 Hz or 220 to 240V AC 50/60 Hz electrical supply. A label on the rear panel of the vaporizer states the voltage requirement for the vaporizer.

The integral power supply unit consists of a transformer and an AC to DC converter that provides the 12VDC and 5VDC supplies for the electrical system.

Filler assembly

The filler assembly uses an agent specific fitting to ensure that only a Suprane™ (desflurane) specific bottle equipped with a Saf-T-Fill™ valve can be inserted to fill the vaporizer.

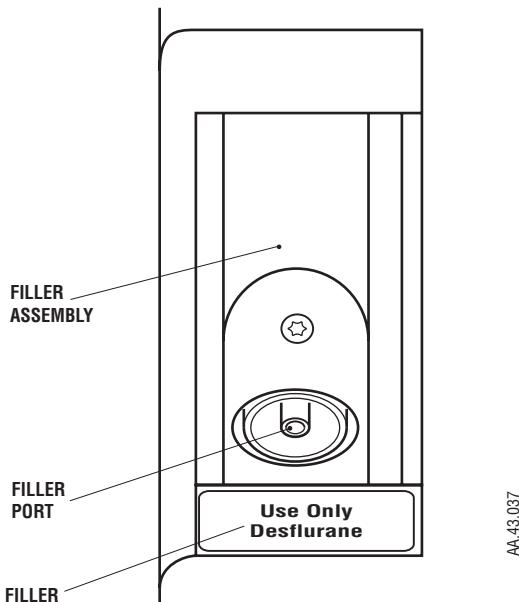


Figure 1-2 • Filler assembly

Drain plug	The drain plug is located at the base of the vaporizer (see Figure 2-3).
------------	--

⚠ CAUTION	Do not remove the drain plug. Draining the vaporizer can result in rapid loss of pressure and/or agent, which could lead to injury to the operator. It must only be removed at a Datex-Ohmeda Authorized Service Center.
------------------	--

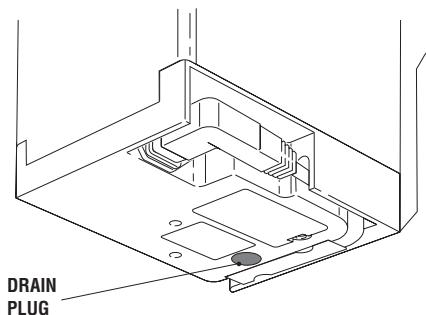


Figure 1-3 • Vaporizer base

Power cord and battery

If the AC power supply fails, a Duracell MN1604 or VARTA Energy 2000 battery incorporated in the base of the vaporizer provides power for the auditory and visual alarms only. The battery must be replaced annually.

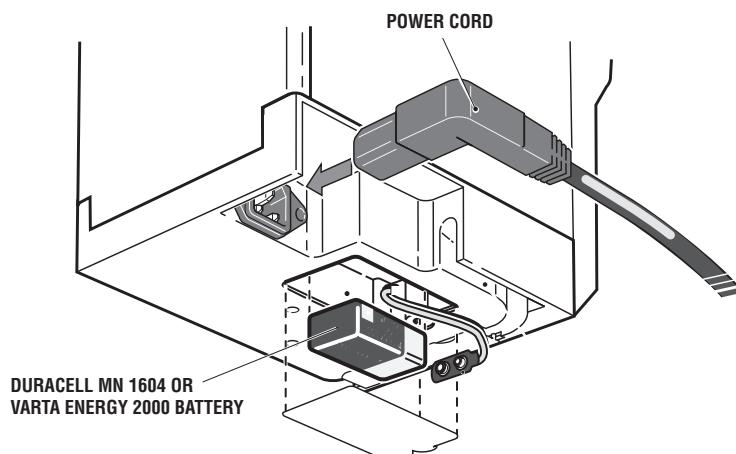


Figure 1-4 • Power cord and battery

Equi-potential stud

The equi-potential stud ∇ is located on the top of the vaporizer. When connected, it minimizes any electrical potential difference between the vaporizer casing and the anesthesia system.

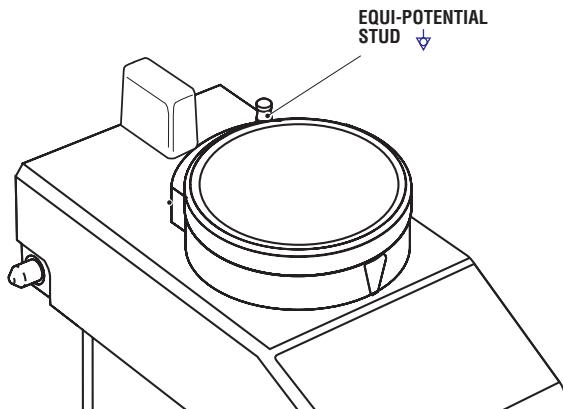


Figure 1-5 • Equi-potential stud

Sump

The sump contains the agent and includes the agent filling port, the drain, the heaters and the agent level sensor.

The sump has a total nominal capacity of 390 milliliters (ml) which consists of a nominal 330 ml indicated volume and a nominal 60 ml reserve.

Heater elements

Two 100W heater elements, located in the base of the sump, heat the agent to a nominal 39 °C (102 °F) to generate the working pressure.

Two 100W heater elements located in the upper part of the vaporizer help prevent condensation of the anesthetic agent in the vaporizer.

The current supplied to power the heaters alternates between the two heaters in the sump and the two heaters in the upper part of the vaporizer. This minimizes the current requirement.

While it is connected to the electrical supply, the casing of the vaporizer is normally warm to the touch.

Sensors

Internal electro/mechanical sensors monitor and maintain the fresh gas/agent vapor pressure balance and the agent volume.

The internal sensors monitor and display operational status and activate the appropriate alarm indication.

Agent level sensor

An agent level sensing probe measures the agent level. The power must be on for the agent level sensor to activate. If the sump contains between 60 and 390 ml of agent, the LCD level displays the agent level in the sump. For more information, see section 3, Controls and Indicators.

Tilt switch

If the vaporizer is tilted for 10 seconds while the dial is on and it is in operational mode and delivering vapor, vapor delivery will be stopped, as indicated by the flashing NO OUTPUT light and auditory alarm.

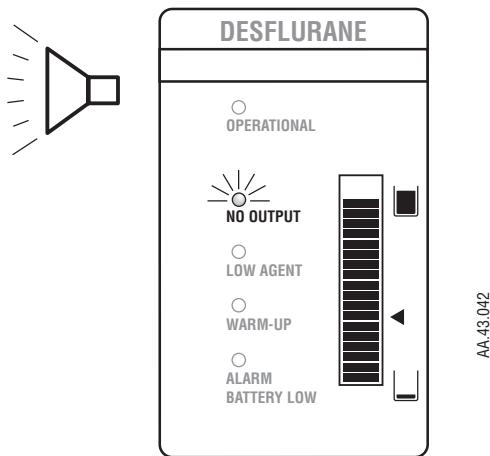


Figure 1-6 • Tilt indicator (NO OUTPUT light)

This page left blank intentionally.

Controls and Indicators

In this section

Controls	3-2
Dial and dial release	3-3
Lock lever	3-4
Auditory alarm mute button.....	3-4
Auditory and visual indicators	3-5
Alarm priority.....	3-6
Status display	3-7
Warm-up	3-7
Operational	3-8
Agent level display.....	3-8
Low agent level.....	3-9
No output	3-10
Alarm battery low	3-11

Controls

Note that only the Datex-Ohmeda vaporizer has the lock lever as shown.

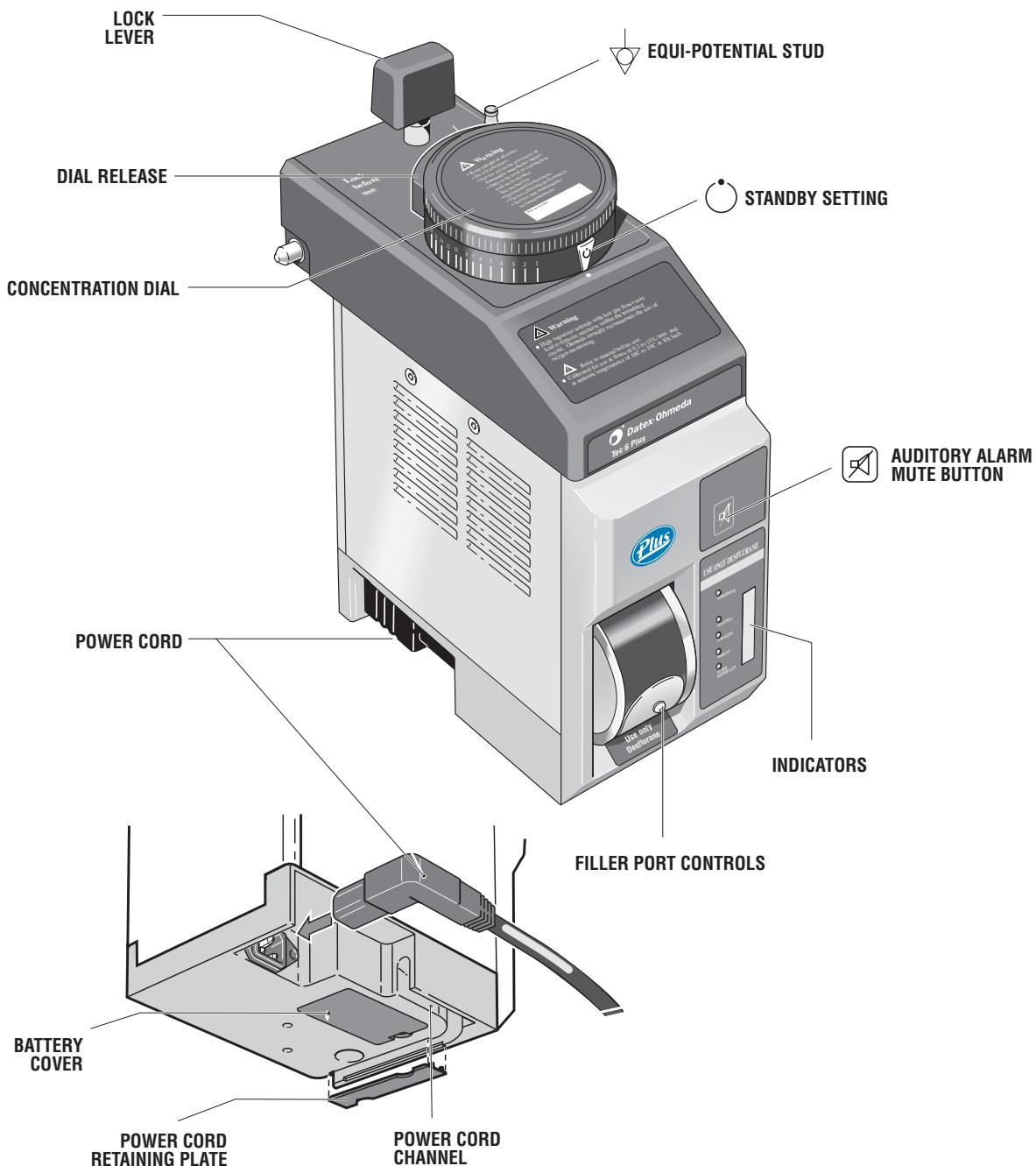


Figure 3-1 • Tec 6 Plus Vaporizer controls (Datex-Ohmeda variant shown)

Dial and dial release

When the operational light is on, push the dial release and turn the dial to set the agent concentration. The dial cannot be turned from the \bigcirc (standby) setting as long as the WARM-UP light is on.

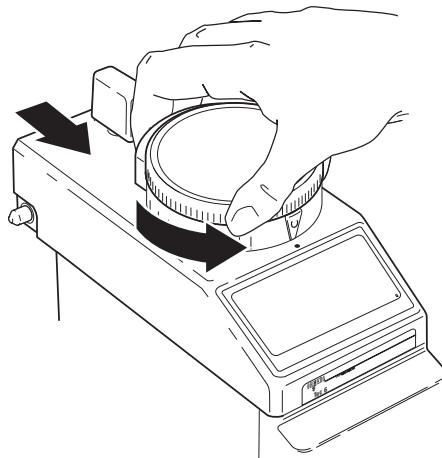


Figure 3-2 • Concentration dial

You can select the level of agent concentration from 1% to 18%. The dial is marked at intervals of 1% from 1% to 10% and at intervals of 2% from 10% to 18%.

Use the dial release again to turn the dial from the \bigcirc (standby) setting and to turn the dial from 12% to a higher percent setting. All other settings can be made without operating the dial release.

A solenoid interlock mechanism ensures that the dial can be turned from the \bigcirc (standby) setting only when the green OPERATIONAL light is illuminated.

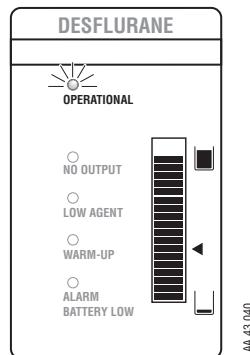


Figure 3-3 • Operational light

Lock lever

Only the Datex-Ohmeda vaporizer has a lock lever. Turn the lever fully clockwise to lock the vaporizer in position

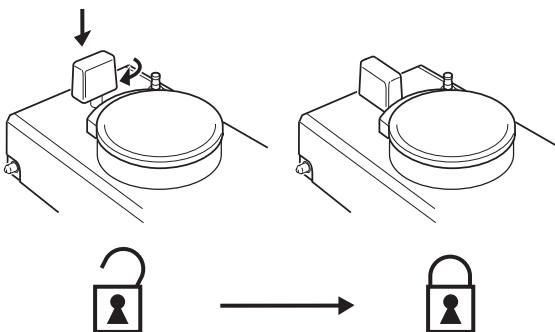


Figure 3-4 • Lock lever

Auditory alarm mute button

Push to silence alarms. Hold for three seconds to start the alarm test (speaker sounds and indicators light up).

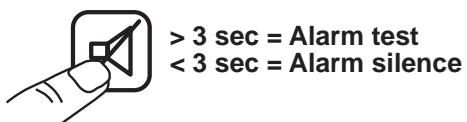


Figure 3-5 • Mute button

Auditory and visual indicators

The status of the vaporizer is indicated by both visual and auditory alarms (see *Status display*).

Press the auditory alarm mute button , located above the display panel, to mute an alarm (see *Agent level display* and *Alarm battery low*).

The LCD agent level display indicates the level of agent. The range is between 60 ml and 390 ml. When the indicator is below the 240 ml refill mark , you can add an additional 240 ml of agent.

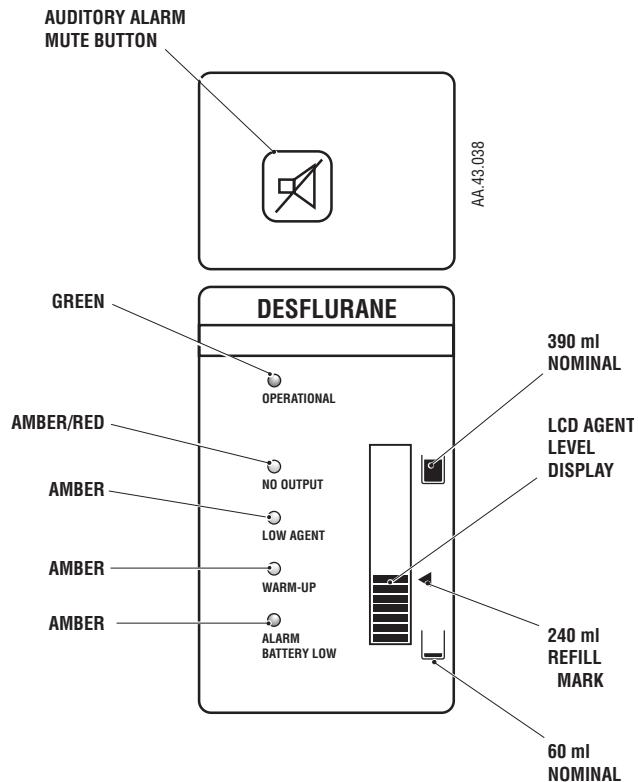


Figure 3-6 • Front panel display

Alarm Priority

The Tec 6 Plus Vaporizer has three distinct alarm priorities. For each priority there is a different set of visual and auditory signals:

Alarm Priority	Visual Signal	Auditory Signal
High	Rapid red flashing light	Two sets of five audio beeps every 10 seconds
Medium	Amber flashing light	One set of three audio beeps every 25 seconds.
Low	Continuous amber light	One audio beep only

Note:

An internal processor failure may also present an intermittent red No Output LED and alarm tone.

Vap. Condition	Low Battery	Low Agent	No Output
Dial ON	Medium Priority	Medium Priority	High Priority
Dial ON, Alarm Silence Pressed 	Low Priority	Audio silenced for 120 seconds, then audio active	High Priority (pressing Silence  has no effect)
Dial turned to 	Low Priority	Low Priority (dial locked until condition corrected)	Low Priority (dial locked until condition corrected)

Figure 3-7 • Alarm priorities

Status display

If the dial is at \bigcirc when an alarm occurs, the auditory alarm does not repeat.

Warm-up

The amber WARM-UP light is continuously illuminated when the vaporizer is in warm-up mode. The dial cannot be turned from \bigcirc when the vaporizer is warming up.

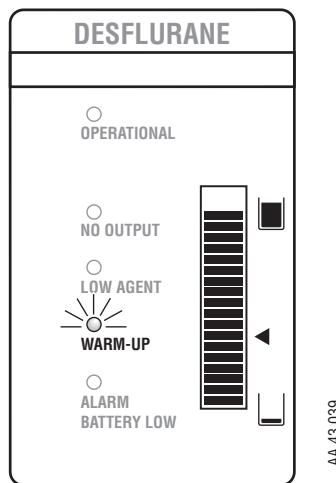


Figure 3-8 • Warm-up

Operational

The green OPERATIONAL light is continuously illuminated when the vaporizer is in operational mode. The dial can be turned from  when the vaporizer is operational.

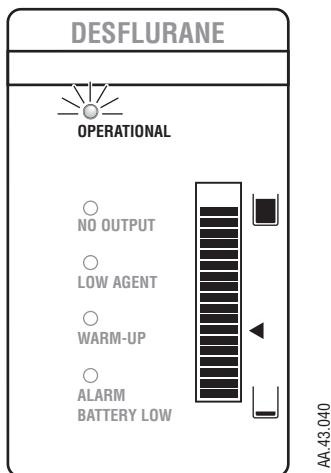


Figure 3-9 • Operational

Agent level display

The LCD agent level display consists of a series of bars that indicate the nominal volume of agent in the vaporizer sump.

The  symbol means there is approximately 390 ml of agent in the sump. The  symbol means there is 60 ml or more of agent in the sump. No bar displayed means there is 60 ml or less of agent in the sump.

As the sump fills, the first agent level indicating bar appears in the LCD volume display when there is between 60 and 80 ml of agent in the sump. As the level increases, more bars are displayed, as illustrated in Figure 3-9, and as the level decreases, fewer bars are displayed.

When the bars are either level with or below the  symbol, the sump can accommodate 240 ml of agent, which is one full bottle. When there are no bars visible, as illustrated in Figure 3-10, the LOW AGENT level alarm is activated (see *Low agent level*).

Note:

The agent level display is calibrated to be most accurate when the vaporizer is in a perfectly level position. Deviations from a level position affect the accuracy of the agent level display and may activate the LOW AGENT level alarm.

Low agent level

This alarm indicates that there is less than 60 ml of agent remaining in the sump and agent should be added.

Pressing  mutes the auditory alarm for a period of 120 seconds to allow time to fill the vaporizer to above 60 ml.

If a LOW AGENT condition occurs during normal operation, the alarm is activated but the green OPERATIONAL light remains illuminated.

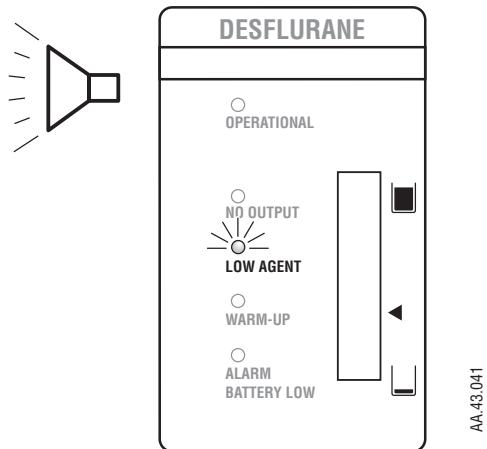


Figure 3-10 • Low agent level

No output

This alarm indicates that the vaporizer has shut down and is no longer delivering vapor.

The NO OUTPUT alarm is activated if the dial is in the ON position and any one of the following occurs:

- The agent level decreases to below 20 ml.
- The vaporizer is tilted for more than 10 seconds.
- A power failure of longer than 10 seconds duration occurs.
- An internal malfunction is detected.

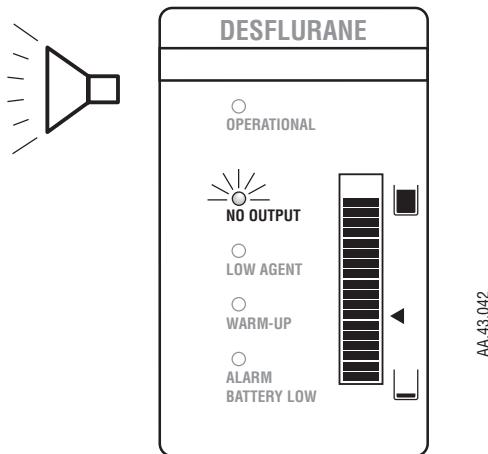


Figure 3-11 • No output

If the NO OUTPUT alarm occurs while the vaporizer is in use, the vaporizer dial must be turned to \odot .

This action de-escalates the alarm to a low priority and illuminates the amber light continuously. Either an alternative vaporizer or an alternative method of anesthesia must be used.

If the NO OUTPUT alarm is activated as a result of a power failure and the dial is at \odot when the power supply is restored, the alarm and display test is activated and the vaporizer returns to either the WARM-UP or the OPERATIONAL mode.

If the dial is not at \odot when the power supply is restored, the NO OUTPUT alarm continues and can only be cancelled by turning the dial to \odot . In this condition, the alarm and display test is not activated and the vaporizer returns to either the WARM-UP or the OPERATIONAL mode.

Alarm battery low

This alarm indicates that the alarm battery voltage is low. A new battery must be installed as soon as practical to support the NO OUTPUT alarm in the event of a subsequent external power failure.

If an ALARM BATTERY LOW condition occurs during normal operation, the alarm is activated but the green OPERATIONAL light remains illuminated.

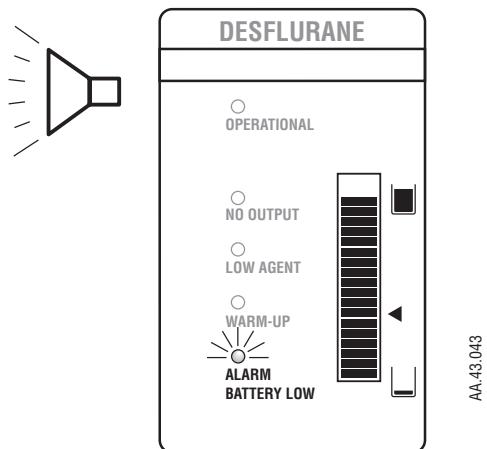


Figure 3-12 • Alarm battery low

Tec 6 Plus Vaporizer

This page left blank intentionally.

Setup and Mounting Procedure

In this section

Vaporizer setup procedure	4-2
Installing the battery and the power cord.....	4-2
Vaporizer mounting Procedure	4-5
Mounting the Datex-Ohmeda vaporizer.....	4-6
Checking the vaporizer for correct mounting	4-10
Removing the vaporizer from a manifold	4-11

Vaporizer setup procedure

⚠ WARNING

The battery terminals must be firmly clipped onto the battery to help prevent a possible disconnection when the vaporizer is moved.

Use only a Datex-Ohmeda power cord to connect the vaporizer to the electrical supply.

When routing the power cord to the electrical supply, ensure that it does not interfere with the correct functioning of other equipment.

⚠ CAUTION

Do not support the vaporizer by holding the control dial and/or locking lever. Hold the main body of the vaporizer with both hands and keep the vaporizer in an upright position. Failure to do so may cause the vaporizer to malfunction.

Install only a Duracell MN1604 or VARTA Energy 2000 nine volt battery in the vaporizer. If any other battery is installed, it can damage the vaporizer.

Installing the battery and the power cord

A new battery and the power cord supplied with the vaporizer must be fitted during initial installation if they are not already installed.

Step 1

Remove the battery cover.

- Invert the vaporizer.
- Unscrew the battery cover securing screw.
- Remove the battery cover.

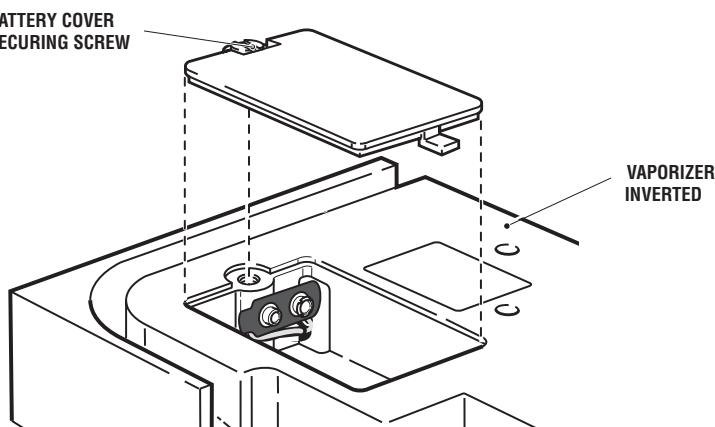


Figure 1-1 • Removing the battery cover

Step 2

Install the battery.

- Clip the battery terminals firmly onto the new battery, observing the correct polarity.
- Insert the battery into the vaporizer.

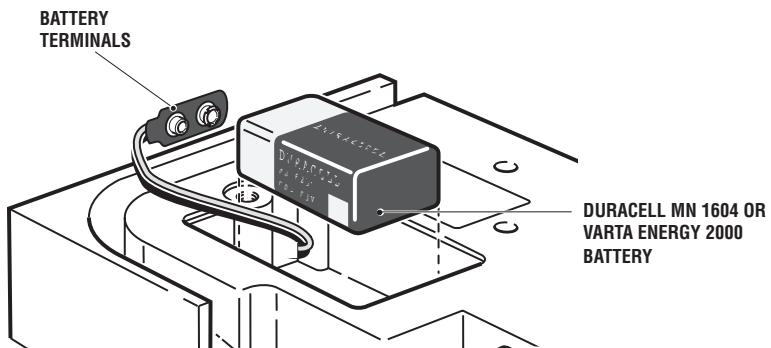


Figure 1-2 • Installing the battery

Step 3

Fit the battery cover to the base of the vaporizer and tighten the securing screw.

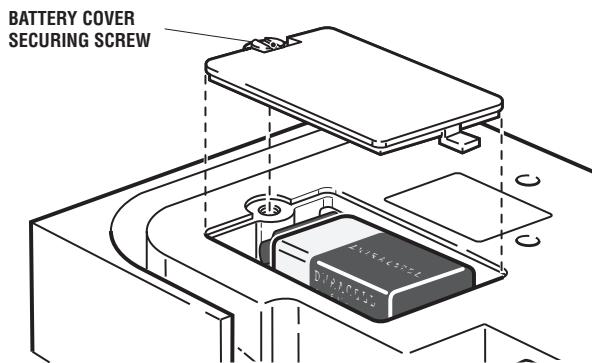


Figure 1-3 • Replacing the battery cover

Step 4

Install the power cord.

- Remove the power cord retaining plate.
- Fit the power cord firmly into the socket of the vaporizer.
- Feed the power cord into the power cord channel.
- Clip the power cord retaining plate back into the base.
- On the North American Dräger vaporizer, feed the lead around the back of the vaporizer and secure the lead by means of the 'P' clip.

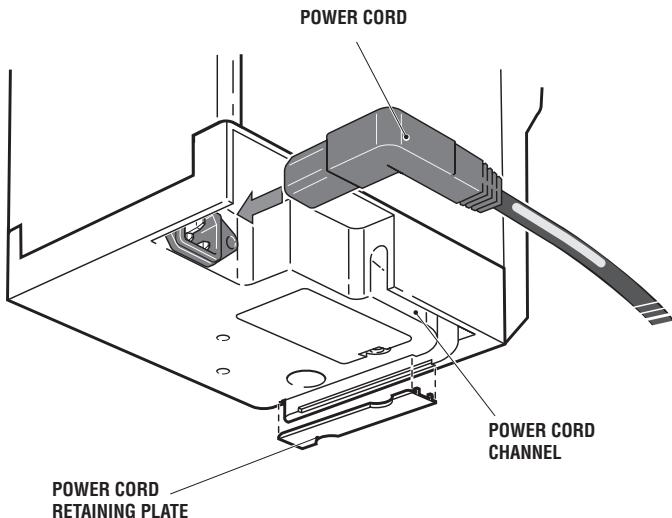


Figure 1-4 • Installing the Datex-Ohmeda power cord

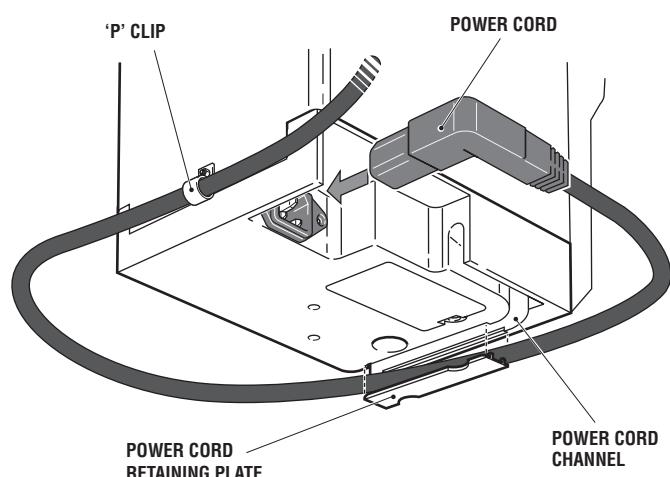


Figure 1-5 • Installing the North American Dräger power cord

Vaporizer mounting Procedure

⚠ WARNING The Tec 6 Plus vaporizer for North American Dräger (NAD) must be installed on a NAD anesthesia machine equipped with an exclusion manifold. The installation must be performed by an individual trained in the servicing of NAD anesthesia equipment. Each vaporizer is supplied with O-rings and screws for the service person to install the vaporizer onto the manifold.

Do not mount the vaporizer downstream of the common gas outlet. Mounting the vaporizer in any position other than that recommended in this manual can cause patient injury.

Do not connect any vaporizer other than a Tec 6 Plus, Tec 6, Tec 5, or Tec 4 onto a Selectatec™ Series Manifold. Connecting any other vaporizer onto the manifold may make the interlock system ineffective and can result in the ability to administer anesthetic agent mixtures, possibly causing patient injury.

Before mounting a vaporizer onto the Selectatec™ Series manifold, ensure that each manifold port valve O-ring is intact and that there is no foreign matter around the mating surfaces. A damaged O-ring and/or foreign matter around the mating surfaces can cause leaks.

Some versions of the Selectatec™ Series Mounted Manifold provide mounting positions for three vaporizers. These versions require the center position to be occupied even if only two vaporizers are fitted. If the center position is not occupied, the interlock which helps to ensure that only one vaporizer at a time can be turned on is ineffective.

Mounting the Datex-Ohmeda vaporizer

Later versions of the Selectatec™ Series Mounted Manifold that provide mounting positions for three vaporizers incorporate an additional interlock which ensures that only one vaporizer at a time can be turned on even if the center position is not occupied.

Step 1

Set the dial to \odot .

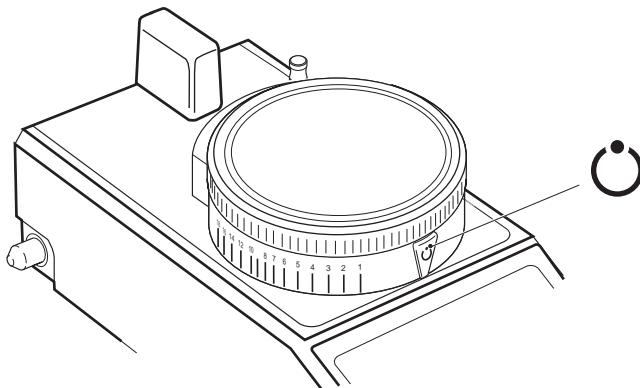


Figure 1-6 • Setting the concentration dial

Step 2

Unlock the locking lever.

- Turn the lever counterclockwise.
- Make sure the lever releases.

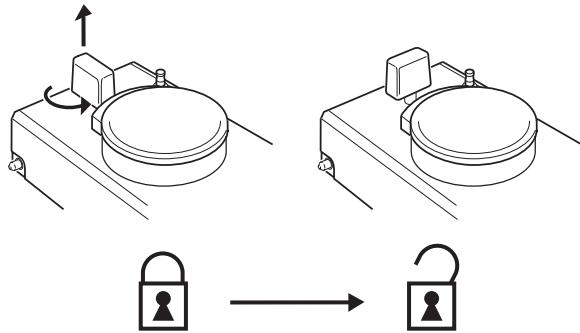


Figure 1-7 • Unlocking the locking lever

Step 3

Ready the manifold.

- Remove any plugs fitted to the vaporizer interlock block ports.
- Verify that each manifold port valve O-ring is intact. If necessary, remove the existing O-rings and fit one new O-ring to each port valve, as described in the relevant anesthesia system O & M Manual. Replacement O-rings are supplied with each vaporizer.

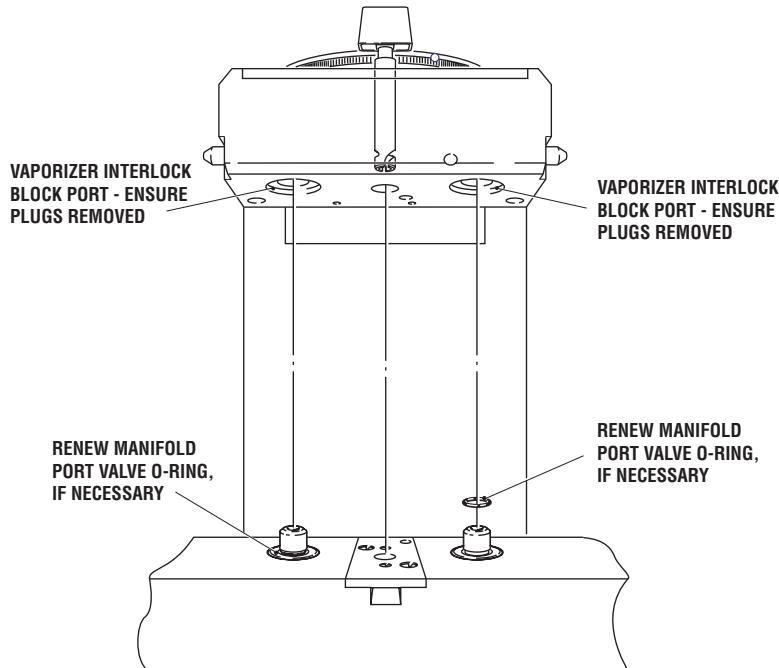


Figure 1-8 • Readying the manifold

⚠ CAUTION

To ease the routing of the power cord, the Tec 6 Plus Vaporizer must be mounted onto the far right-hand side of the manifold for Excel and Modulus machines. For other machines, refer to their manuals.

Step 4

Install the vaporizer into the manifold.

- Hold the main body of the vaporizer in an upright position with both hands.
- Lower the vaporizer onto the manifold, ensuring that the vaporizer interlock block ports engage correctly with the manifold port valves.

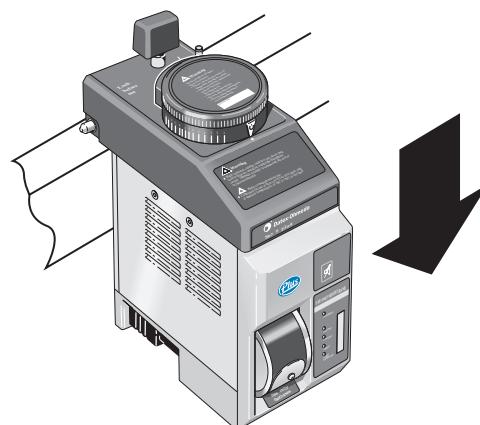


Figure 1-9 • Installing the vaporizer

⚠ CAUTION

Push the locking lever down all the way before attempting to turn it. The mechanism can be damaged if an attempt is made to turn the lever before it is at the full extent of its vertical travel.

Step 5

Lock the vaporizer onto the manifold.

- Push the locking lever ① down all the way.
- Turn it clockwise ② to the locked position ③ to lock the vaporizer onto the manifold.

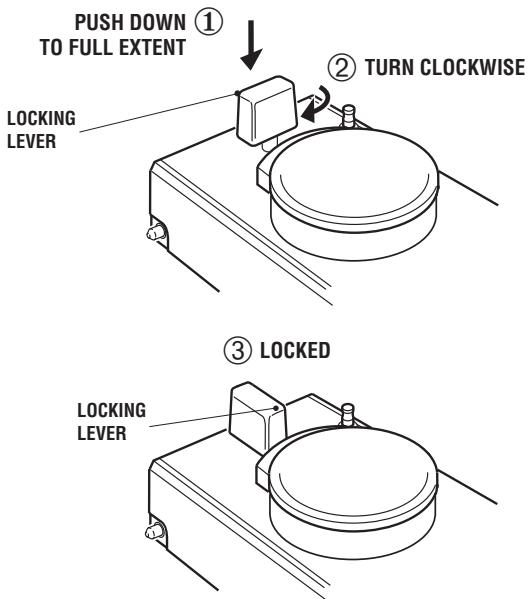


Figure 1-10 • Locking the vaporizer

⚠ WARNING

Do not route the power cord over the top of the Selectatec™ Series manifold. To do so may affect the correct functioning of the Tec 6 Plus Vaporizer and/or any other vaporizer.

Step 6

Route the power cord.

- Route the power cord around the right-hand side of the anesthesia machine as viewed from the front.
- * Refer to the Aestiva manual if mounting vaporizer on an Aestiva.

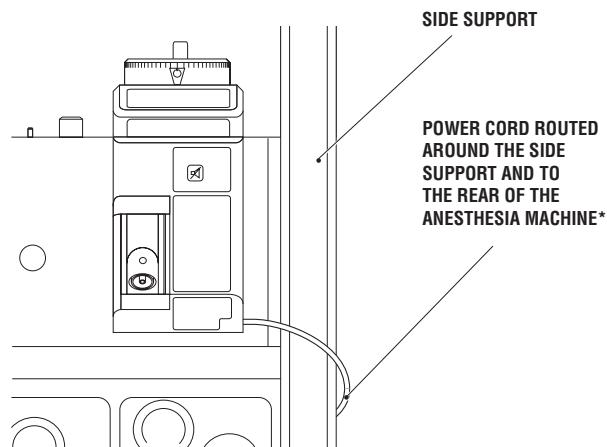


Figure 1-11 • Routing the power cord

Step 7

Ensure that the vaporizer is correctly mounted (see *Checking the vaporizer for correct mounting*).

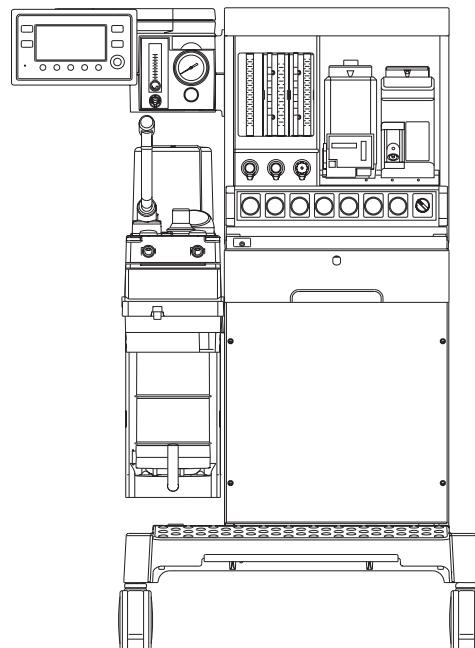


Figure 1-12 • Checking the vaporizer mounting

Checking the vaporizer for correct mounting

⚠ WARNING

To help to ensure correct operation, do not use a vaporizer that is either visibly out of line on the manifold or that can be lifted off the manifold when the locking lever is in the locked position.

If more than one vaporizer is fitted, visually check to make sure that the tops of the vaporizers are horizontal. If the vaporizer is visibly out of line, perform steps 3 and 4 as described in *Removing the vaporizer from a manifold* and remount it correctly.

When the vaporizer appears to be level and the locking lever is in the locked position, attempt to lift the vaporizer straight up from the manifold. If the vaporizer can be lifted off the manifold, it is not correctly mounted. Remount the vaporizer (see *Vaporizer mounting Procedure*).

Removing the vaporizer from a manifold

⚠ WARNING Only an individual trained in the servicing of NAD anesthesia equipment can remove a vaporizer from a North American Dräger (NAD) machine.

This procedure applies only to the Datex-Ohmeda vaporizer.

Step 1

Set the dial to \odot .

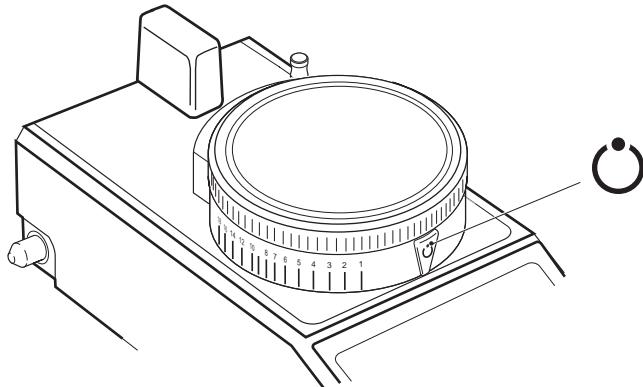


Figure 1-13 • Setting the dial

Step 2

Disconnect the vaporizer from the AC power supply.

Step 3

Unlock the locking lever.

- Turn the locking lever counter-clockwise ①.
- Release the locking lever ② and check that the locking lever springs up to the unlocked position ③ to release the vaporizer from the manifold.

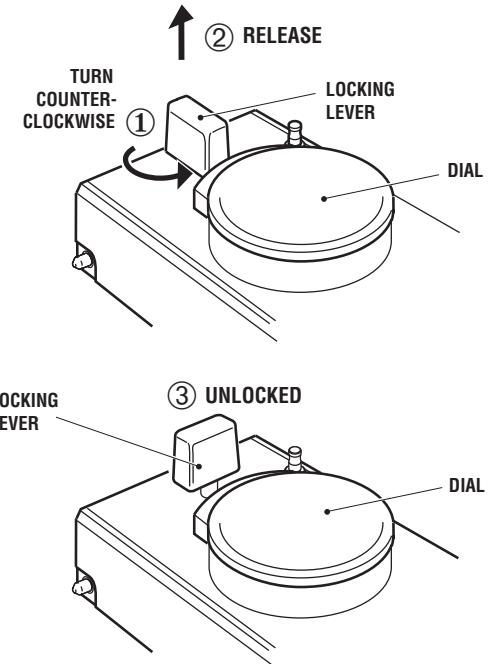


Figure 1-14 • Unlocking the locking lever

Step 4

Carefully lift the vaporizer up from the manifold.

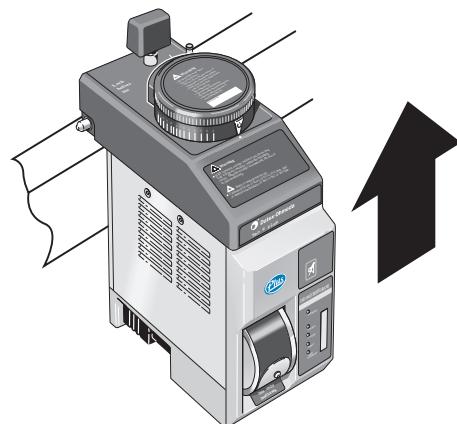


Figure 1-15 • Lifting the vaporizer

Operating Instructions

In this section

Alarm and display test	5-2
Preoperative checkout	5-5
Setting the dial	5-10
Filling the vaporizer	5-13
Filling procedure	5-14

Alarm and display test

⚠ WARNING Only use vaporizers that are in a serviceable condition.

⚠ CAUTION Before connecting the vaporizer to an AC power supply, be sure it is within the ambient operating temperature range (see *Performance* in Chapter 9).

Step 1

Connect the power cord from the vaporizer to an approved hospital grade outlet socket.

⚠ WARNING Do not use the vaporizer if during the alarm and display test any one of the five lights and all the LCD agent level indicator bars do not flash or the auditory alarm does not operate for a period of approximately four seconds.

Step 2

Verify that the alarm and display test for a period of approximately four seconds as follows:

- Each light and all the LCD agent level indicator bars on the front display panel flash.
- The auditory alarm is activated.

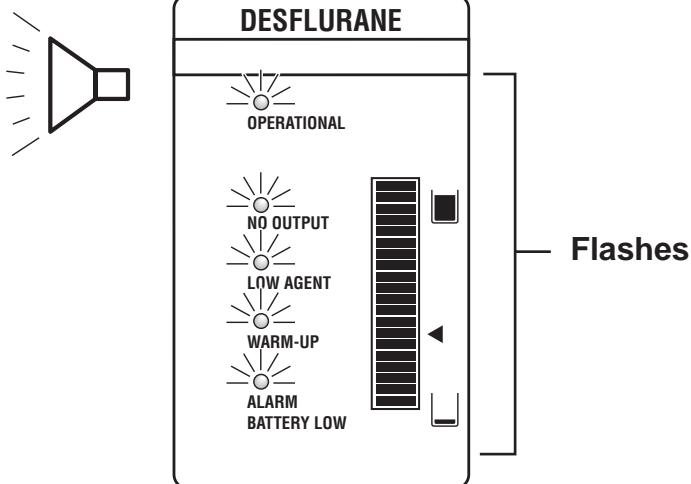


Figure 1-1 • Verifying the alarm

Step 3

If the LOW AGENT light remains illuminated after the alarm and display test is completed, fill the vaporizer as described in *Filling the vaporizer*.

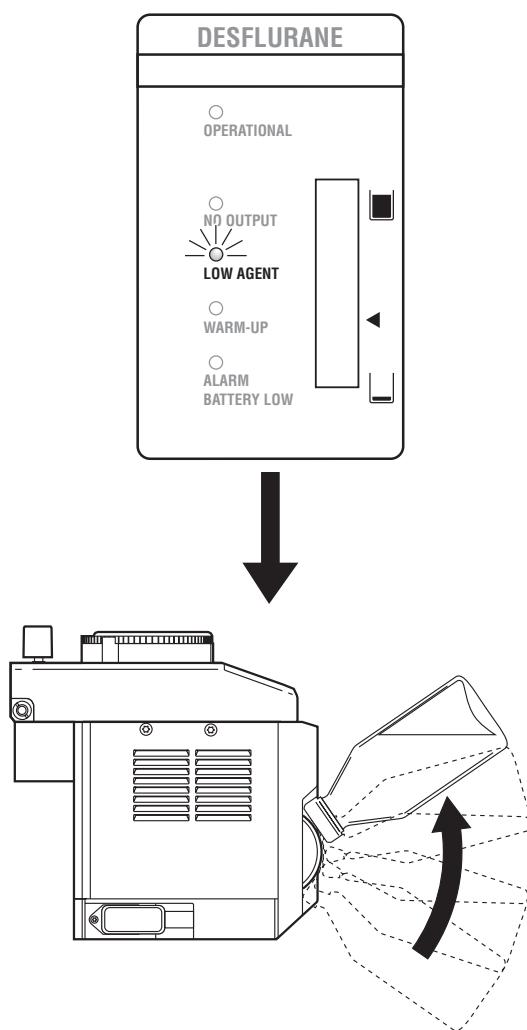


Figure 1-2 • Filling the vaporizer

Step 4

If there is sufficient agent in the sump, check that each light is extinguished, except the amber WARM-UP light which indicates that the vaporizer is in its warm-up condition. If the vaporizer is warm before it is connected to the electrical supply, the green OPERATIONAL light may illuminate immediately.

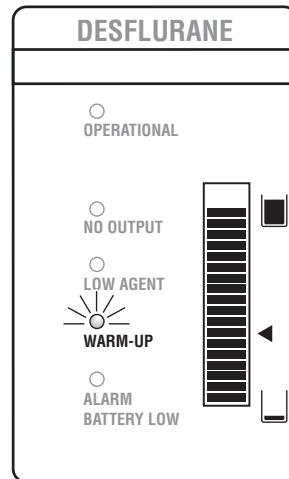


Figure 1-3 • Checking Warm-up light

Step 5

After a warm-up period of up to 10 minutes check that the amber WARM-UP light extinguishes and the green OPERATIONAL light illuminates to indicate that the vaporizer is ready for use.

If the OPERATIONAL light does not illuminate within 10 minutes, refer to the *Troubleshooting guide* in Chapter 8.

Approx.
ten minutes →

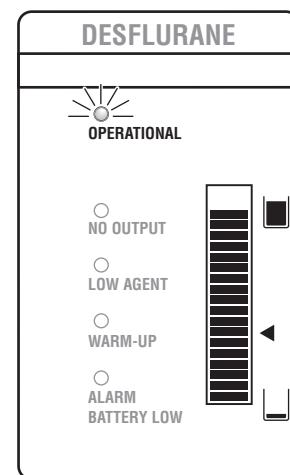


Figure 1-4 • Checking Operational light

Step 6

The alarm and indicators can be tested at any time by pressing  for at least three seconds to activate the alarm and display test. Activating the test does not affect the operation of the vaporizer.



Figure 1-5 • Testing alarm

Preoperative checkout

Step 1

Test the vaporizer for leaks.

- The Tec 6 Plus Vaporizer can be positive pressure or negative pressure leak tested.
- Perform the leak test as described in the relevant anesthesia system's operation and maintenance manual initially with the dial at $\textcircled{0}$ (①). Repeat the test with the vaporizer dial turned to the 1% setting (②) and then turn the dial to the $\textcircled{0}$ setting (③).

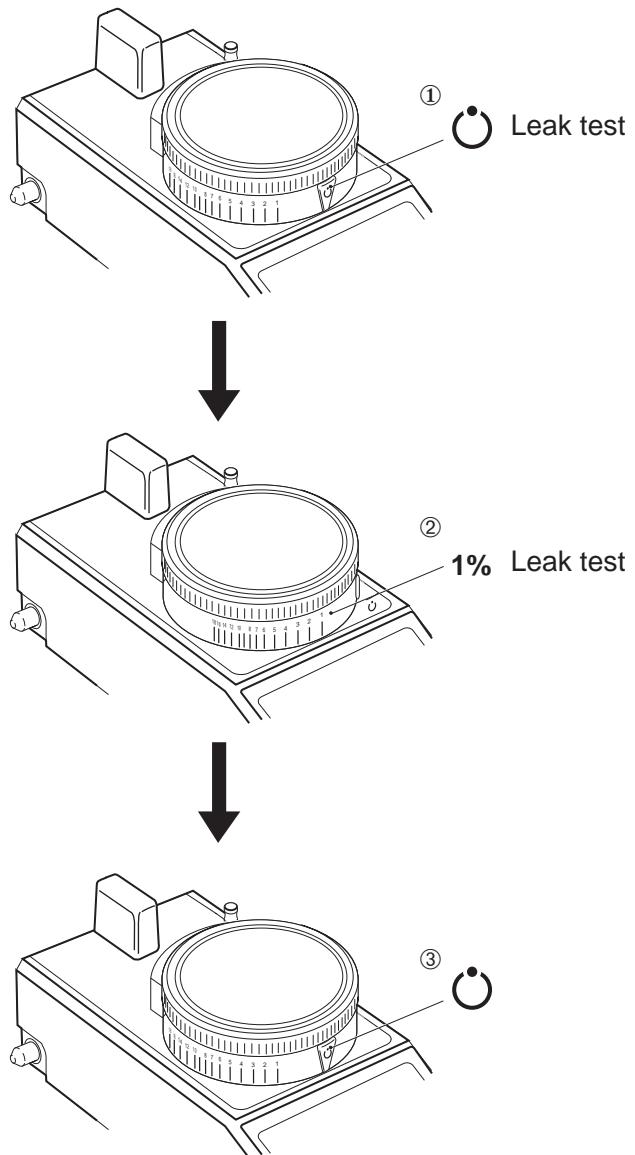


Figure 1-6 • Testing for leaks

Step 2

Check the battery.

- Check the amber ALARM BATTERY LOW light.
- If the light is illuminated, fit a new battery as described in *Changing the battery* in Chapter 6.
- Check that the light extinguishes.

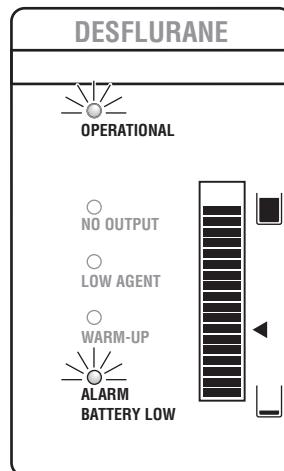


Figure 1-7 • Checking the battery

Step 3

Test the vaporizer output alarm.

- Turn the dial to a setting of 1% or above.
- Unplug the power cord from its outlet socket.
- Wait for at least 15 seconds and then check that both the auditory alarm and the red NO OUTPUT light are activated.
- If the alarm and light are not activated, do not use the vaporizer.

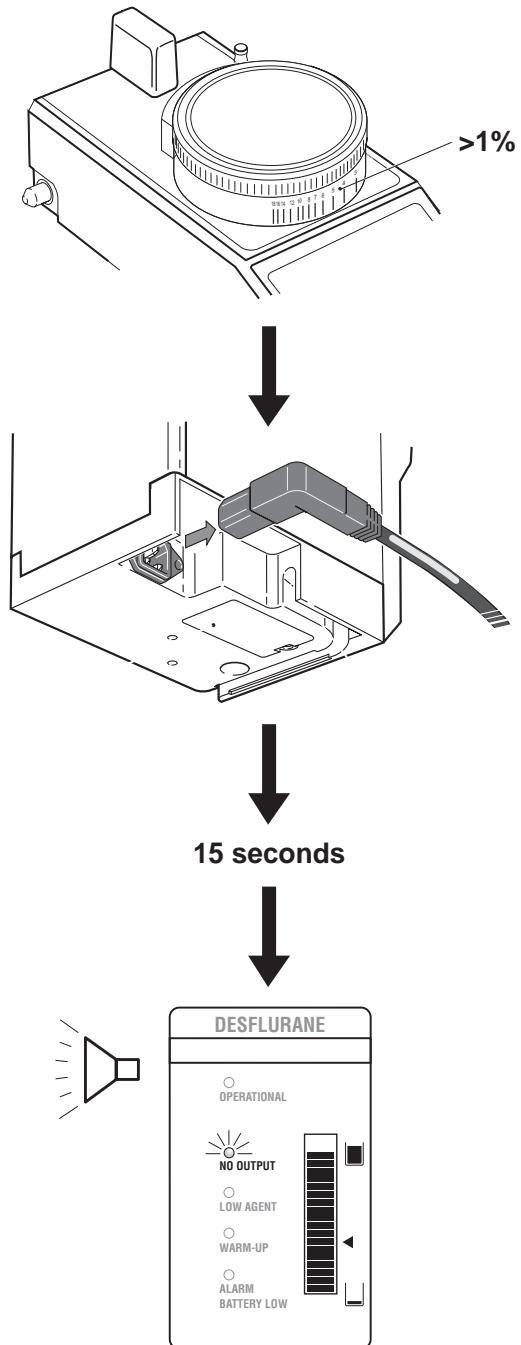


Figure 1-8 • Testing the output alarm

Step 4

Reconnect power to the vaporizer.

- When the alarm and light are activated, turn the dial to the \textcircled{O} setting.
- Reconnect the power cord.
- Check that the alarm and display test is activated.

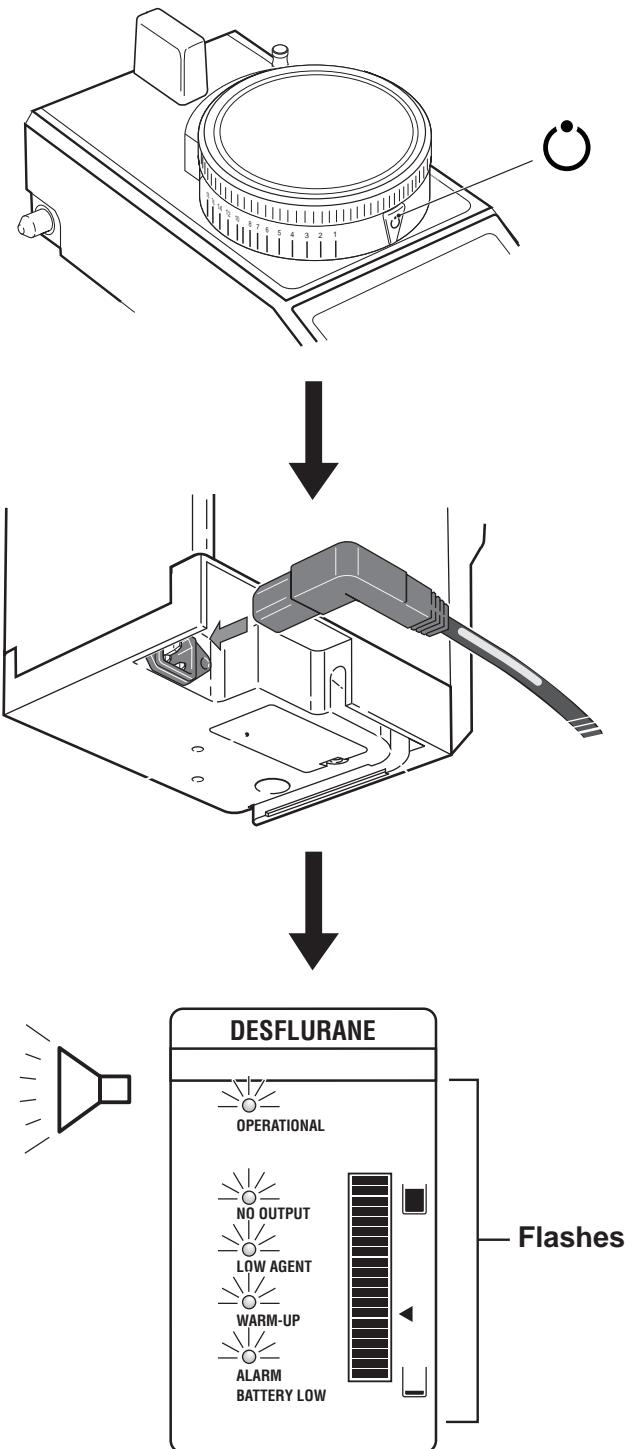


Figure 1-9 • Reconnecting the vaporizer

Step 5

When the green OPERATIONAL light illuminates, the vaporizer is ready for operation.

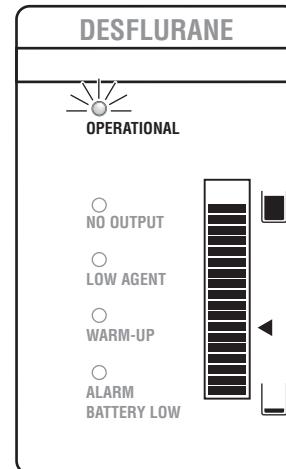


Figure 1-10 • Checking the Operational light

Setting the dial

⚠ WARNING

High percent dial settings combined with low gas flows may lead to hypoxic mixtures within the breathing circuit. Datex-Ohmeda strongly recommends the use of oxygen monitoring.

The dial release must be operated to turn the dial from the $\textcircled{0}$ setting and also to increase the dial setting to above 12%. Do not operate the dial release when turning the dial to any other setting, it may result in overriding the 12% stop and causing an inadvertent delivery in excess of 12%.

The vaporizer has not been calibrated at any dial setting between $\textcircled{0}$ and 1%. Do not use the vaporizer at dial settings between $\textcircled{0}$ and 1%.

Important

It is a requirement of European Standard EN 740 - *Anaesthetic Work-stations And Their Modules*, that the gas monitoring device referred to in *What is a Tec 6 Plus Vaporizer?* in Section 2 of this manual is in operating condition, by being enabled and functioning, prior to use of the vaporizer.

An appropriate anesthetic gas monitor must be used to monitor the concentration of anesthetic agent vapor in the inspiratory gas when the vaporizer is in operation, in order to provide protection against hazardous output in the event of a device malfunction.

Datex-Ohmeda strongly recommends the use of anesthesia gas monitoring with this equipment. Refer to local standards for mandatory monitoring.

Step 1

Press the dial release and turn the dial in a counter-clockwise direction from the $\textcircled{0}$ setting.

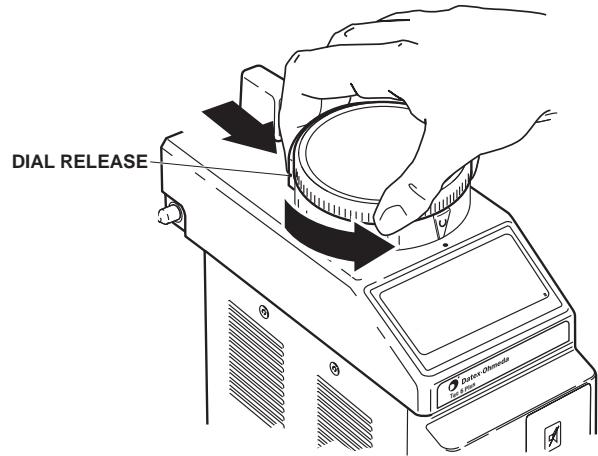


Figure 1-11 • Releasing the dial

Step 2

Release the dial release and turn the dial to the required percentage setting.

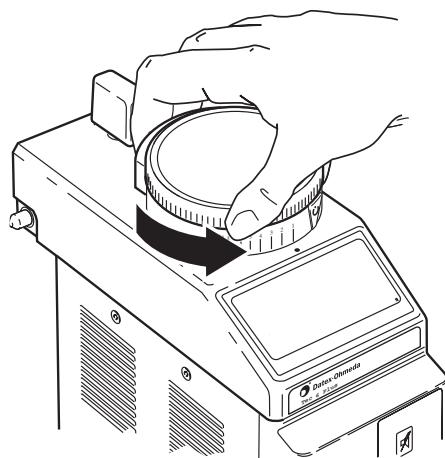


Figure 1-12 • Dialing the required percentage

Step 3

Check that when the vaporizer dial is turned from $\textcircled{0}$, no other vaporizer mounted on the same manifold can be turned on.

Step 4

Turn the dial to the \textcircled{O} setting and check that the dial release springs out.

The vaporizer will remain in standby \textcircled{O} , ready for further use if required, until the electrical supply is disconnected.

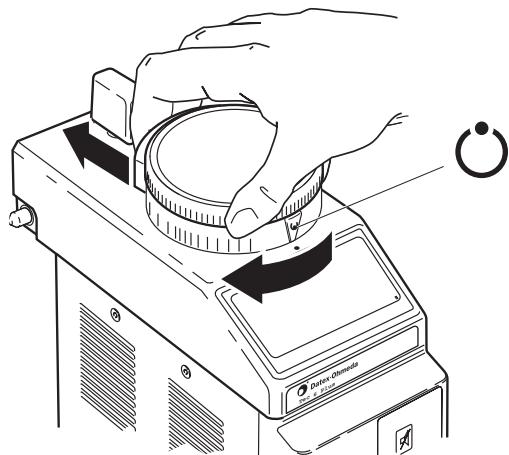


Figure 1-13 • Setting dial to standby

Filling the vaporizer

⚠ WARNING Do not fill the vaporizer with any substance other than Suprane™ (desflurane). If any substance other than Suprane™ (desflurane) is used, patient injury could occur.

When the vaporizer is in use, do not fill the vaporizer if the following conditions apply:

- The dial setting is more than 8% at flows of 8 liters/minute or above.
- The vaporizer is subjected to any high back pressure.
- The Suprane™ (desflurane) has been refrigerated or chilled below 18 °C.

Failure to comply with this warning may result in a temporary decrease in delivered concentration and activate the NO OUTPUT alarm.

Only fill the vaporizer when it is in an upright position. Failure to do so may result in the vaporizer being over filled.

Only fill the vaporizer when it is connected to the electrical supply. This enables you to observe the agent level display. Do not attempt to fill the vaporizer when the level display indicates that it is full.

To avoid explosive hazards, flammable anesthetic agents such as Ether and Cyclopropane must not be used in this vaporizer. Only anesthetic agents which comply with the requirements for non-flammable anesthetic agents in the IEC 601-2-13 Standard, *Particular Requirements for the Safety of Anesthesia Machines*, are suitable for use in the presence of this vaporizer.

As this vaporizer is not suitable for use with flammable anesthetic agents such as Ether or Cyclopropane, the use of antistatic breathing tubes and face masks is not necessary. The use of antistatic or electrically conductive breathing tubes when utilizing high frequency electric surgery equipment may cause burns and is therefore not recommended in any application of this vaporizer.

Filling procedure

When filling the Tec 6 Plus Vaporizer, observe the following:

- The vaporizer must only be filled when it is in an upright position.
- The vaporizer sump can be filled when the vaporizer is in its WARM-UP cycle or at any time the vaporizer is in use except as noted in the warning. If the vaporizer is in its OPERATIONAL condition, the time taken for the agent to flow into the vaporizer may be increased.
- Only agent bottles with a Saf-T-Fill™ bottle probe specific to Suprane™ (desflurane) should be inserted into the filler port.

Step 1

Remove the bottle cap from the Suprane™ (desflurane) bottle and ensure that the O-ring is correctly fitted to the bottle probe.

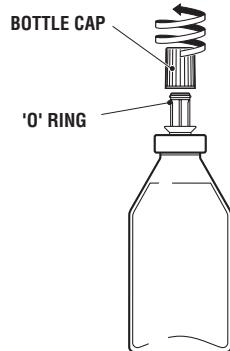


Figure 1-14 • Removing the bottle cap

Step 2

Insert the bottle probe into the filler port and then push the bottle firmly against the spring pressure until it is fully engaged in the filler port.

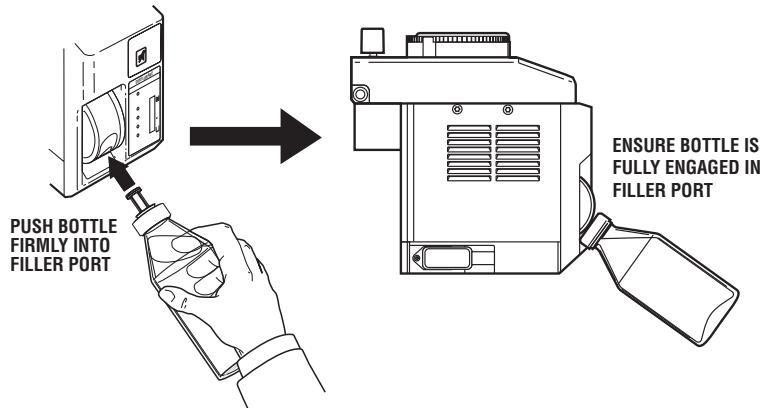


Figure 1-15 • Loading the bottle

⚠ WARNING

Ensure that the bottle probe is fully engaged into the filler port before attempting to lift the bottle. If the bottle cannot easily be lifted, do not force it, otherwise the valve can be broken.

Step 3

Lift the bottle upwards.

If the bottle cannot easily be lifted, it may be because the bottle has not been completely inserted.

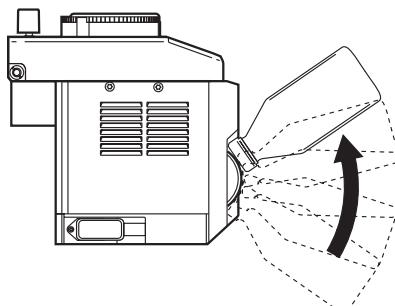


Figure 1-16 • Lifting the bottle

Step 4

Fill the vaporizer.

- When the bottle moves easily, lock the bottle in the upper position.
- When the bottle reaches the upper stop, the agent bubbles for up to 45 seconds before it flows from the bottle through the filler port into the vaporizer sump.
- Hold the bottle in position at the upper stop and fill until the bottle is empty or the indicator on the display panel indicates that the sump is full.

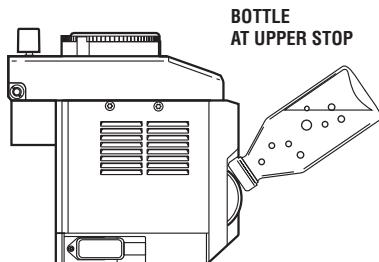


Figure 1-17 • Filling the vaporizer

⚠ WARNING

Grip the bottle firmly while rotating it downwards from the upper stop position to the lower stop position and hold the bottle firmly in the filler port until the small amount of agent in the system has drained back into the bottle. Failure to do so may result in spilling agent.

Step 5

Drain the bottle and remove.

- Grip the bottle firmly and lower it from the upper stop position to the lower stop position.
- When the bottle reaches the lower stop position, hold the bottle firmly in the filler port for at least five seconds to allow the small amount of agent in the filler system to drain back into the bottle.
- To avoid dropping the bottle, support the bottle as it is automatically unlocked from the filler port and released from the filler. Note: Do not twist the bottle as you pull the bottle out
- The valve on the bottle automatically closes to help avoid loss of agent.

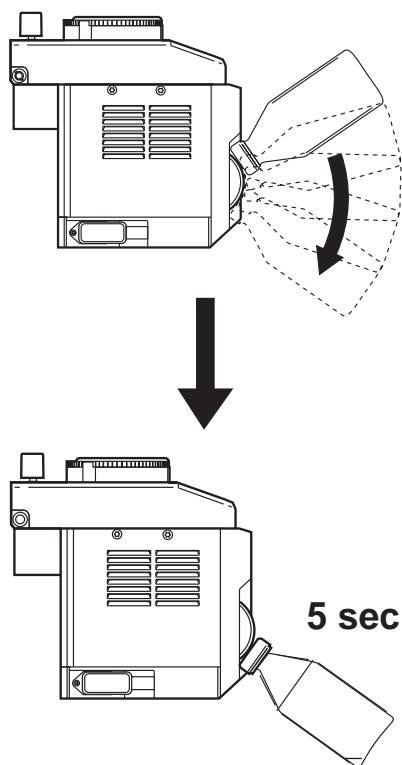


Figure 1-18 • Removing the bottle

This page left blank intentionally.

Maintenance

In this section

Maintenance intervals	6-2
Cleaning	6-2
External cleaning	6-2
Internal contamination	6-3
Output concentration check	6-3
Changing the battery	6-4
Spare parts	6-7

User Maintenance

Maintenance Intervals

Prior to performing any maintenance procedures or returning to a service center for repairs, clean and disinfect the vaporizer.

Annually:	Battery replacement.
Two years from purchase date and every six months thereafter:	Planned safety inspections together with the anesthesia system by qualified personnel. Inspect and perform Output concentration check.

Cleaning

⚠ WARNING Do not put any substance other than Suprane™ (desflurane) into the vaporizer sump.
Do not immerse the vaporizer in water or any other liquid.
Do not autoclave the vaporizer.
Do not allow cleaning agents to accumulate in the filler, the gas inlet and outlet ports or around the control dial.

External cleaning

To clean external surfaces, use a moist cloth and a detergent (pH 7 to 10.5).

For disinfection purposes, cleaning agents of a surface germicide type should be used. In terms of material compatibility, cleaning agents which contain the following active ingredients are suitable for use:

- Aldehydes,
- Alcohol,
- Quaternary ammonium compounds.

⚠ WARNING To avoid possible damage to the vaporizer, do not use the following compounds as cleaning agents:

- Halogen hydrolyzing compounds,
- Strong organic acids,
- Oxygen hydrolyzing compounds.

Internal contamination

If the vaporizer is filled or partly filled with an incorrect volatile agent or other contaminant, proceed as follows:

1. Remove the vaporizer from service immediately and label the vaporizer stating that it is contaminated.
2. Return the vaporizer to the Datex-Ohmeda Authorized Service Center stating that the vaporizer is contaminated and, if possible, the type of contaminant in the vaporizer.

Output concentration check

Connect the Tec 6 Plus to Anesthesia Machine.

1. Set the oxygen output of the anesthesia machine to a flow of 5 ± 0.5 L/min.
2. Ensure that the fresh gas output is connected to a gas scavenging system.
3. Measure the concentration at the fresh gas outlet, using an agent monitor which is calibrated to measure desflurane.
4. Allow the readings to stabilize and check that the readings are within specified tolerances.
5. Document and maintain the test results, including the date, person performing the test, and serial number of the unit tested.

The accuracy of the measuring equipment must be considered when obtaining the readings!

Dial Setting	Min Vol %	Max Vol %
1	.5	1.50
6	5.10	6.90
12	10.20	13.80
18	15.30	20.70

Changing the battery

Change the battery every 12 months, irrespective of condition.

Step 1

Turn the dial to \odot

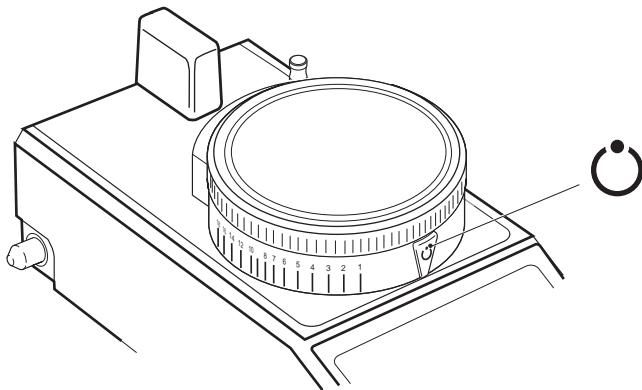


Figure 6-1 • Setting the dial to standby

Step 2

Disconnect the power cord from the electrical supply.

Step 3

Remove the battery cover.

- Remove the vaporizer from the manifold of the anesthesia system as described in *Removing the vaporizer from a manifold* in Chapter 4 and invert the vaporizer.
- Unscrew the battery cover securing screw.
- Remove the battery cover.

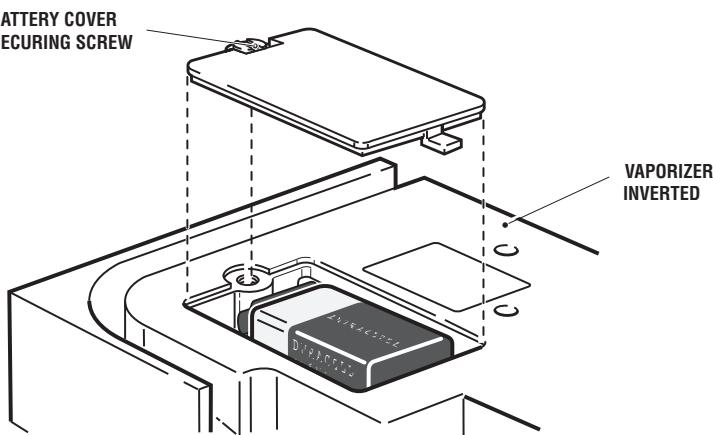


Figure 6-2 • Removing battery cover

Step 4

Remove the battery and disconnect the terminals.

Dispose of the battery according to local regulations.

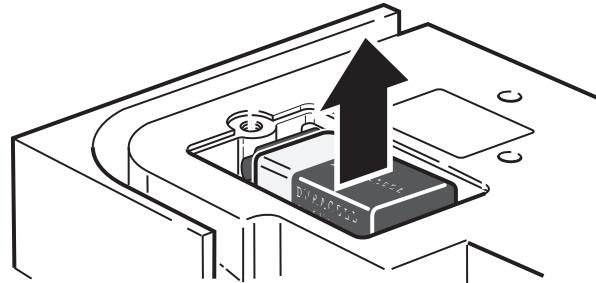


Figure 6-3 • Removing the battery

⚠ CAUTION

Install only a Duracell MN1604 or VARTA Energy 2000 nine volt battery in the vaporizer. If any other battery is installed, it can damage the vaporizer.

⚠ WARNING

The battery terminals must be firmly clipped onto the battery to help prevent a possible disconnection when the vaporizer is moved.

Step 5

Install a new battery.

- Clip the battery terminals firmly onto the new battery, observing the correct polarity.
- Insert the battery into the vaporizer.

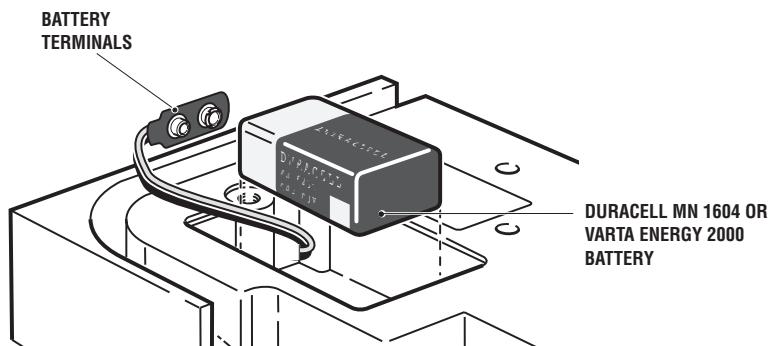


Figure 6-4 • Installing new battery

Step 6

Fit the battery cover to the base of the vaporizer and tighten the securing screw.

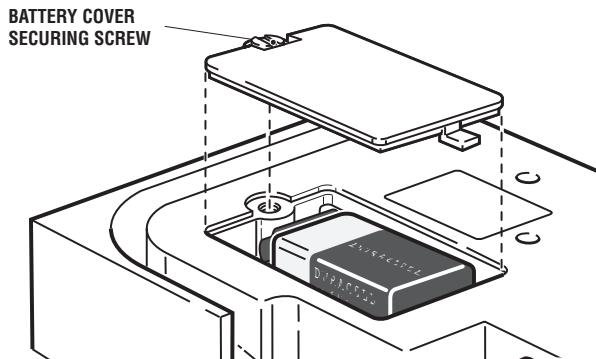


Figure 6-5 • Replacing battery cover

⚠ WARNING

Do not throw batteries onto a fire, do not open with force and do not recharge. To do so may result in operator injury. When disposing of batteries, treat them as special waste and dispose of according to local regulations.

Spare parts

Description	Part No.
O-ring Kit	1104-3025-000
Battery	1370219
NAD Mounting Kit	1107-7097-000
<i>Power Cords:</i>	
Aestiva (universal) .5 m	1006-3796-000
IEC 320 1.5 m	1107-3191-000
North America 3.5 m	1107-3189-000
North America 1.5 m	1107-3190-000
Continental Europe 1.5 m	1007-3186-000
Continental Europe 3.5 m	1107-3185-000
United Kingdom 3.5 m	1107-3187-000
Australia / New Zealand 1.5 m	1107-4020-000
Australia / New Zealand 3.5 m	1107-4025-000

To order contact your Datex-Ohmeda customer service representative.

Tec 6 Plus Vaporizer

This page left blank intentionally.

Principle of Operation

In this section

Alarm and indicator display	7-2
Delivery of gas/agent vapor	7-2

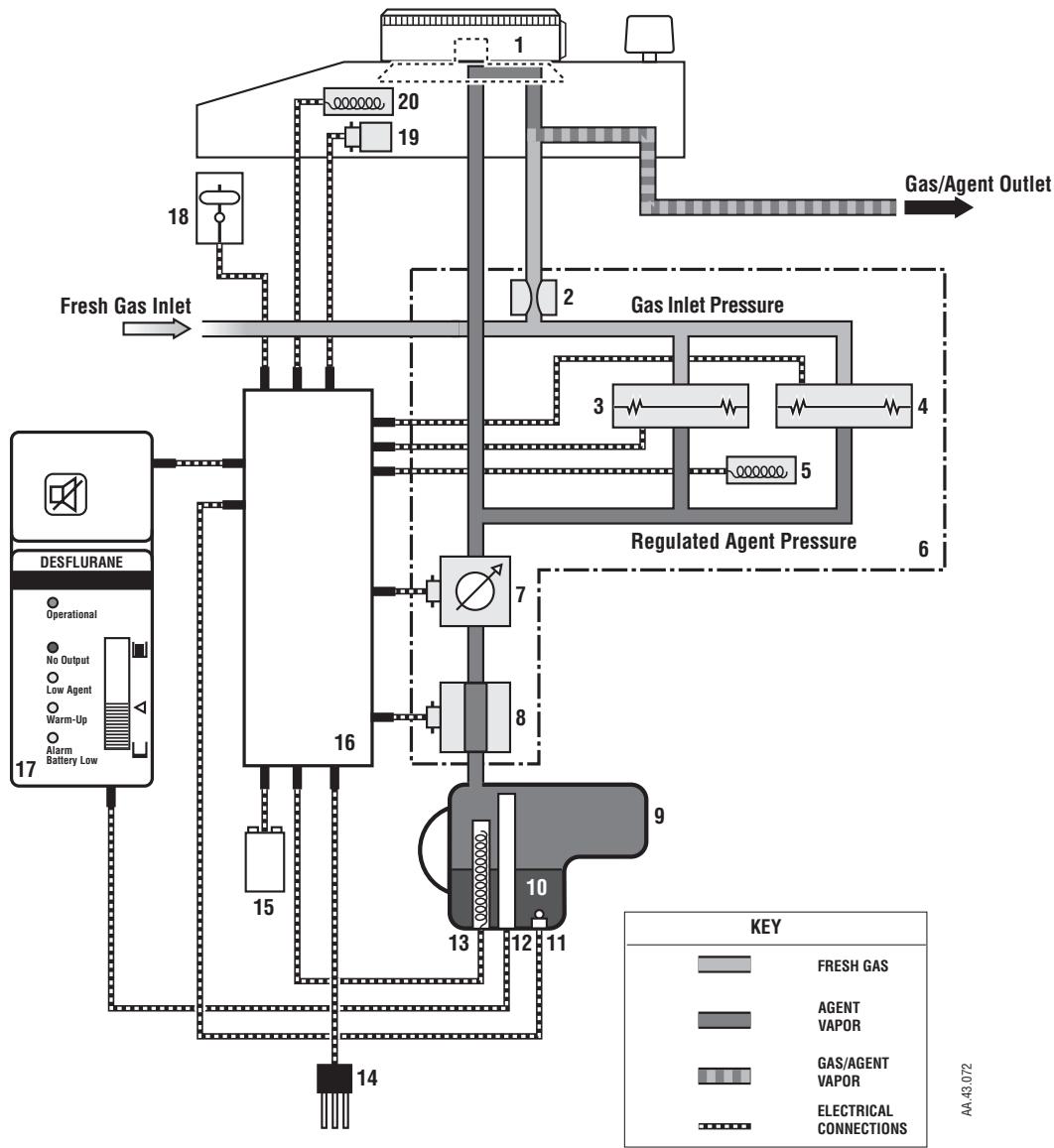
Alarm and indicator display

See Figure 7-1.

1. When the electrical supply is connected, each light and each LCD agent level display bar on the front display panel (17) flashes and the auditory alarm activates to indicate that the alarms are operational. After approximately four seconds, each light is extinguished, the LCD bars stop flashing and the auditory alarm is silenced.
2. The amber WARM-UP light is illuminated to indicate that the vaporizer is in its warm-up cycle and the LCD agent level display bars indicate the amount of agent in the sump.
3. During the warm-up cycle, the shut-off valve (8) is closed to prevent the supply of vapor to the pressure regulating valve (7), and the electronics (16) perform the zero check.
4. When the vaporizer attains the required operating temperature, the amber WARM-UP light is extinguished and the green OPERATIONAL light illuminates to indicate that the vaporizer is ready for use.

Delivery of gas/agent vapor

1. When the vaporizer is ready for use, a signal from the electronics (16) operates the solenoid (19) in the interlock mechanism which allows the dial and rotary valve (1) to be turned.
2. When the dial and rotary valve (1) are turned, a signal from the electronics (16) opens the shut-off valve (8).
3. The pressure control transducer (3) sends a signal of the difference between the gas inlet pressure and the regulated agent pressure to the electronics (16). The electronics alters the regulated agent pressure by opening or closing the pressure regulating valve (7) to balance the pressures.
4. When the regulated agent pressure of the circuit is equal to the gas inlet pressure, the vaporizer functions correctly.
5. The dial and rotary valve (1) regulates the volume of vapor being delivered to the fresh gas mixture.
6. The fresh gas mixes with the vapor just prior to the gas/agent outlet in the proportions consistent with the selected dial setting.



KEY TO COMPONENTS	
1	DIAL & ROTARY VALVE
2	FIXED RESTRICTOR
3	PRESSURE CONTROL TRANSDUCER
4	PRESSURE MONITOR TRANSDUCER
5	HEATER IN VAPOR CONTROL MANIFOLD
6	VAPOR CONTROL MANIFOLD ASSEMBLY
7	PRESSURE REGULATING VALVE
8	SHUT-OFF VALVE
9	SUMP ASSEMBLY
10	LIQUID AGENT
11	LEVEL SWITCH
12	LEVEL SENSOR
13	SUMP HEATERS
14	MAINS LEAD
15	BATTERY
16	ELECTRONICS
17	FRONT DISPLAY PANEL
18	TIFF SWITCH
19	SOLENOID IN THE INTERLOCK BLOCK
20	HEATER IN THE VALVE PLATE

Figure 1-1 • Vaporizer schematic

Tec 6 Plus Vaporizer

This page left blank intentionally.

Troubleshooting

In this section Troubleshooting guide.....8-2

Troubleshooting guide

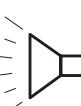
The following table details the alarm condition and the actions which must be performed to correct the alarm condition and the possible cause.

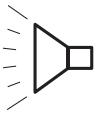
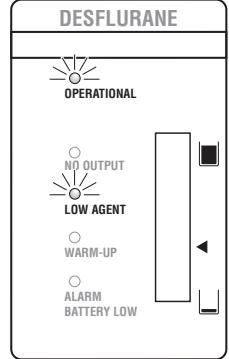
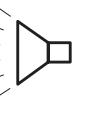
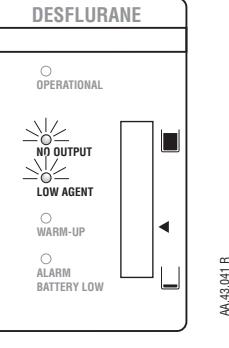
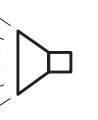
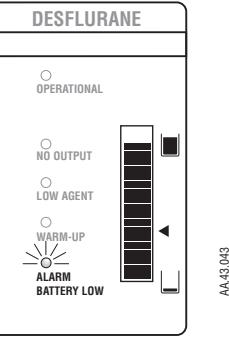
If vaporizer fails to function correctly after the appropriate action has been taken, send the vaporizer to the Datex-Ohmeda Authorized Service Center for repair.

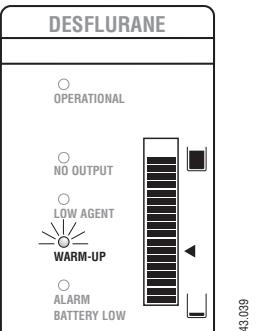
Note:

If the dial is at the \odot setting when an alarm occurs, the auditory alarm does not repeat.

Vaporizer Status	Action	Possible cause
The vaporizer dial release can be depressed, but the dial will not turn. When more pressure on the dial release is applied, a click on the mechanism is detected. The dial still cannot be turned.	<p>Let go of the dial release, then:</p> <ol style="list-style-type: none"> Allow the vaporizer to warm up until the green OPERATIONAL light illuminates. If another vaporizer is in use, turn the other vaporizer to dial to OFF/ \odot. 	<ol style="list-style-type: none"> During WARM UP, the interlock mechanism prevents vaporizer use. The interlock mechanism of another vaporizer is operative.

Alarm indication	Action	Possible cause
 	<p>Turn the dial to \odot. Restore external power. The vaporizer may go to operational or perform a thorough system check before going operational, depending on time of external power restoration, or permanently red alarm if an internal power failure is detected.</p> <p>Note that a power failure causes the higher pitched audio alarm tone.</p> <p>Turn the dial to \odot and level the vaporizer.</p> <p>⚠ WARNING Use an alternative means of anesthesia.</p>	<p>Power failure.</p> <p>Tilt</p> <p>Any internal malfunction.</p>

Alarm indication	Action	Possible cause
 	Fill the sump with Suprane™.	Agent level <60 ml. ⚠ WARNING If this condition persists until there is less than 20 ml of agent in the sump, the NO OUTPUT alarm is activated and the output ceases.
  AA43.041 R	Turn the dial to  and fill the sump with Suprane™. ⚠ WARNING If the NO OUTPUT alarm persists, use an alternative means of anesthesia.	Agent level <20 ml.
  AA43.043	Change the battery as soon as practical (ideally within eight hours of alarm indication).	Alarm battery low.

Alarm indication	Action	Possible cause
 AA 43039	<p>⚠ WARNING Do not attempt to use the vaporizer.</p>	<p>If the amber WARM-UP light does not extinguish within ten minutes after the vaporizer is connected to an electrical supply, there may be an internal malfunction.</p>

Specifications

In this section

Calibration	9-2
Electrical supplies	9-2
Performance.....	9-3
Classification	9-4
Weight and dimensions	9-5
Flow characteristics.....	9-6
Effects of output at varied altitudes	9-7
Effects of ambient temperature	9-7
Effects of back pressure.....	9-7
Effects of carrier gas composition	9-8

Note:

All specifications are nominal and subject to change without notice.

Calibration

Check the calibration certificate that is included with your Tec 6 Plus Vaporizer.

⚠ WARNING

The Tec 6 Plus Vaporizer can only be calibrated at a Datex-Ohmeda Authorized Service Center.

The Tec 6 Plus Vaporizer is calibrated at 760 torr and at a nominal 21 °C for the following concentrations (v/v percent): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16 and 18, using O₂ as the carrier gas flowing at five liters/minute.

Electrical supplies

Voltage requirement	100 to 120V AC 50/60 Hz or 220 to 240V AC 50/60 Hz
Power consumption	250 VA nominal
Current input	Maximum current requirement is 2.0 A

The ~ symbol on the vaporizer rating label denotes that the external AC power supply must be single phase sinusoidal alternating current.

Performance

Concentration range	1 to 18%
Scale	1% from 1 to 10% 2% from 10 to 18%
Calibrated flow range at 21 ± 2 °C	0.2 to 10 liters/minute
Accuracy at 5 liters/ min O ₂	± 0.5% v/v of delivered agent or ± 15% dial setting (whichever is greater)
Liquid capacity	390 ml nominal volume (indicated on level display) 240 ml refill capacity indicator nominal 60 ml reserve (not indicated on level display)
Flow resistance	Less than 50 cm H ₂ O at 5 liters/minute of O ₂ at 21 °C Less than 250 cm H ₂ O at 15 liters/minute of O ₂ at 21 °C
Battery	Duracell MN 1604 or VARTA Energy 2000
Operating temperature range	18 °C to 30 °C (64 °F to 86°F)
Operating humidity range	30% to 75% relative humidity (non-condensing)
Storage temperature range	-40 °C to 60 °C (-40 °F to 140°F)
Storage relative humidity range	0% to 95% relative humidity at 40 °C (non-condensing)
Storage atmospheric pressure	70.0 to 106.0 kPa

Classification

The vaporizer can be powered indefinitely unless a fault condition occurs, also known as continuous rating.

Type of protection against electric shock is Class 1. Accessible conductive parts of Class 1 equipment are connected to a protective earth in such a way that they do not become live in the event of a failure of the basic insulation.

The  symbol on the vaporizer rating label denotes the degree of protection against electric shock, which is Type B.

The vaporizer is not protected against liquid flowing into the interior of the unit.

Weight and dimensions

Datex-Ohmeda

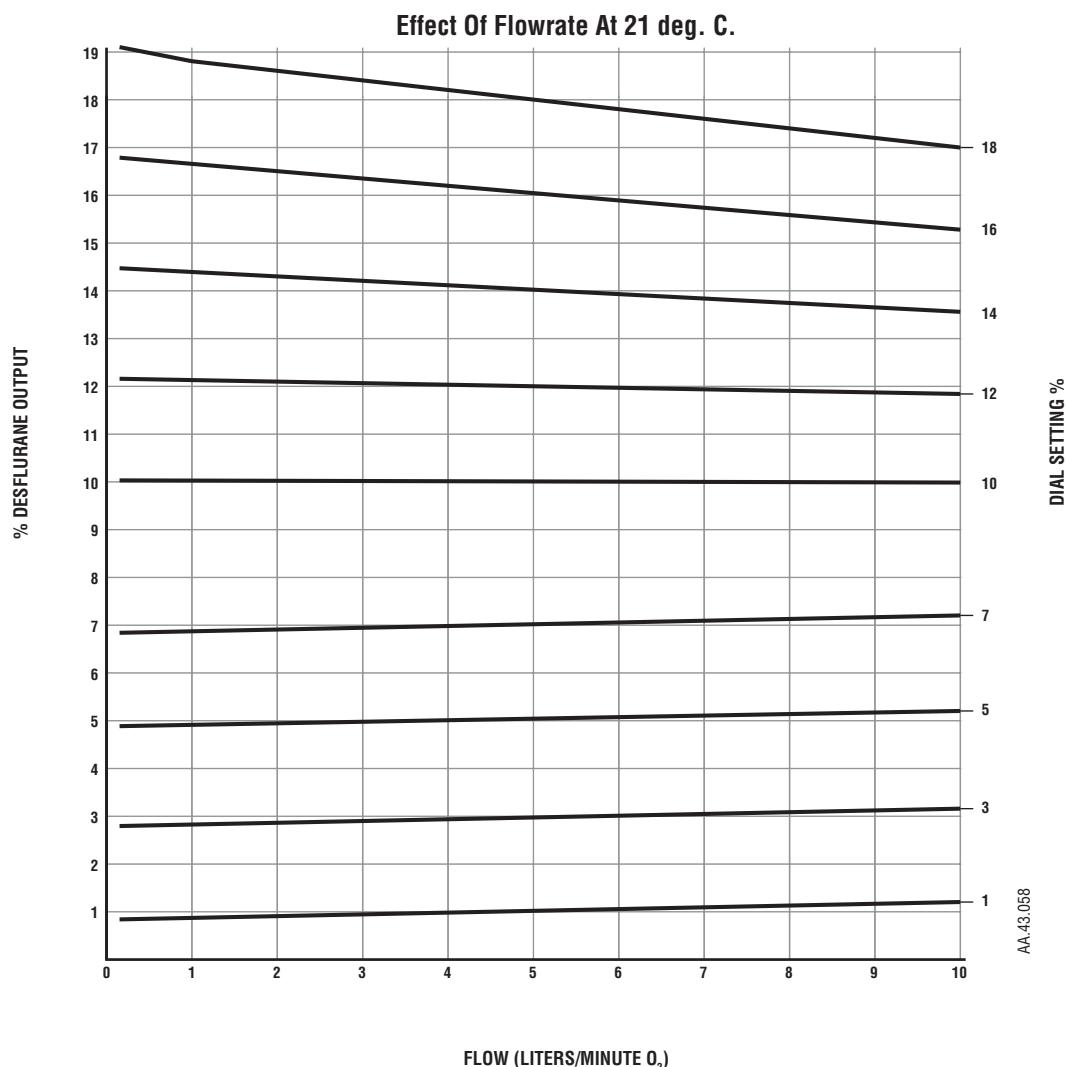
Weight	9.5 kg	20 lb 15 oz (empty)
Depth	235 mm	9 1/4 inches
Width	110 mm	4 3/8 inches
Height	250 mm	9 7/8 inches (in the unlocked position)

North American Dräger

Weight	10 kg	22 lb (empty)
Depth	235 mm	9 1/4 inches
Width	110 mm	4 3/8 inches
Height	235 mm	9 1/4 inches

Flow characteristics

The graph shows the nominal output of the Tec 6 Plus Vaporizer at 760 torr.



Effects of output at varied altitudes

The Tec 6 Plus Vaporizer is calibrated in percent v/v and the calibration is not affected by ambient pressure changes. The partial pressure of the delivered agent at any selected dial setting varies directly with the changes in ambient air pressure. The required dial setting can be calculated using the following formula:

$$\text{Required Dial Setting} = \text{Normal Dial Setting \% v/v} \times \frac{760 \text{ torr}}{\text{ambient pressure (torr)}}$$

The table below shows the dial setting on a Tec 6 Plus Vaporizer at altitudes of 1000m and 2000m respectively above sea level:

Normal dial setting % v/v	Required dial setting percent	
	At an altitude of 1000m (3282 feet)	At an altitude of 2000m (6564 feet)
5	5.5	6
10	11	12.5
14	17	18

Effects of ambient temperature

The performance of the Tec 6 Plus Vaporizer is not significantly affected by the temperature variations within the operating range specified in *Performance*.

Effects of back pressure

Fluctuating back pressure does not significantly affect the output of the Tec 6 Plus Vaporizer.

Steady back pressure does not significantly affect the concentration of the agent delivered (v/v), but does increase partial pressure of the agent. The increase is in the ratio of total back pressure to the vaporizer calibration pressure of 760 torr.

Effects of carrier gas composition

Small output decreases can occur when the carrier gas composition is changed from 100% oxygen.

When either air or nitrous oxide is employed as the carrier gas, the output is lowered compared to the output when oxygen is the carrier gas. This effect is the greatest (up to 20% of setting) at low flows when nitrous oxide is employed, but using nitrous oxide reduces the required inspired concentrations of volatile agent which can, depending upon the proportion, mitigate the decreases in output from the vaporizer.

Warranty

In this section Warranty.....10-2

Warranty

This product is sold by Datex-Ohmeda under the warranties set forth in the following paragraphs.

Such warranties are extended only with respect to the purchase of this Product directly from Datex-Ohmeda or Datex-Ohmeda's Authorized Dealers as new merchandise and are extended to the first Buyer thereof, other than for purpose of resale.

For a period of twenty-four (24) months from the date of original delivery to the first Buyer or to Buyer's order, but in no event for a period of more than two years from the date of original delivery by Datex-Ohmeda to a Datex-Ohmeda Authorized Dealer, this Product, other than its expendable parts, is warranted against functional defects in materials and workmanship and to conform to the description of the Product contained in the Operation and Maintenance manual and accompanying labels and/or inserts, provided that the same is properly operated under conditions of normal use, that regular periodic maintenance and service is performed and that replacements and repairs are made in accordance with the instructions provided. This same warranty is made for a period of thirty (30) days with respect to expendable parts. The foregoing warranties shall not apply if the Product has been repaired other than by Datex-Ohmeda or other than in accordance with written instructions provided by Datex-Ohmeda, or altered by anyone other than Datex-Ohmeda, or if the Product has been subject to abuse, misuse, negligence, or accident.

Datex-Ohmeda's sole and exclusive obligation and the Buyer's sole and exclusive remedy under the above warranty is limited to repairing or replacing, free of charge, at Datex-Ohmeda's option, a Product which is confirmed as being defective by Datex-Ohmeda following the Buyer's notification to Datex-Ohmeda and, where requested, return of the Product to Datex-Ohmeda in accordance with the instructions contained in the Servicing Policy section of the O & M Manual, not later than seven (7) days after the expiration date of the applicable warranty. Datex-Ohmeda shall not be otherwise liable for any damages including but not limited to incidental damages, consequential damages, or special damages.

There are no express or implied warranties which extend beyond the warranties herein above set forth. Datex-Ohmeda makes no warranty of merchantability or fitness for a particular purpose with respect to the Product or parts thereof.

Servicing Policy

In this section Servicing policy 11-2

Servicing policy

Repairs and service procedures must be performed at a Datex-Ohmeda Authorized Service Center. Contact your Datex-Ohmeda Service Representative or Datex-Ohmeda Authorized Distributor.

If you are shipping the unit to the nearest Datex-Ohmeda Field Operations Unit, package the vaporizer and power cord securely for protection in its original packaging, and ship it prepaid. Provide the following items:

1. Details of any difficulties experienced with the equipment.
2. Warranty information such as a copy of the invoice or other documentation.
3. Purchase order number to cover repair or service of equipment not under warranty.
4. Ship to and bill to information.
5. The name and telephone number of the person to contact.

A

Accuracy 9-3
 Agent concentration 3-3
 Agent level display 3-5, 3-8
 Agent level indicator 5-2
 Agent level sensing probe 2-9
 Agent level sensor 2-8, 2-9
 LCD 2-9
 Alarm and display test 5-2
 Alarm and indicators test 5-4
 Alarm battery low 3-11
 Alarm Levels 3-6
 Alarm levels
 High 3-6
 Low 3-6
 Medium 3-6
 Ambient operating temperature 5-2
 Auditory alarm
 No output 2-9
 Test 5-2
 Auditory alarm mute button 3-4, 3-5
 Auditory signals 3-6

B

Back pressure 9-7
 Battery 2-5, 9-3
 Changing 6-4
 Disposing 6-6
 Frequency of replacement 2-7, 6-4
 Installing 4-2, 4-3, 6-5
 Removing 6-5
 Replacement type 4-2, 6-5
 Terminals 4-3, 6-5
 Testing 5-6
 Battery cover
 Removing 4-2, 6-4
 Securing screw 4-2, 4-3, 6-4, 6-6
 Bottle
 Lower stop position 5-17
 Upper stop position 5-16
 Breathing tubes 2-4, 5-14

C

Calibrated flow range 9-3
 Calibration 9-2
 Carrier gas composition 9-8
 Concentration range 9-3
 Concentration, setting 3-3
 Condensation 2-8
 Current input 9-2
 Cyclopropane 2-4, 5-13

D

Datex-Ohmeda Authorized Distributor 11-2
 Datex-Ohmeda Field Operations Unit 11-2
 Datex-Ohmeda Service Representative 11-2
 Depth 9-5
 Desflurane 1-3, 2-2, 2-6, 5-13, 5-14
 Refrigeration 5-13
 Dial 3-3
 Setting 5-10
 Dial release 3-3, 5-11
 Drain plug 2-7

E

Electrical supplies 9-2
 Equi-potential stud 2-8
 Ether 2-4, 5-13

F

Face masks 2-4, 5-14
 Filler assembly 2-6
 Filler port 5-15
 Filling the vaporizer 5-14
 Flow resistance 9-3
 Front panel display 3-5

H

Heater elements 2-8
Height 9-5
High frequency surgical apparatus 2-4
High frequency ventilation 2-5
Hospital grade outlet 5-2

I

Interlock block ports 4-7
Interlocks 2-3, 3-3, 4-5, 4-6

L

Leaks, testing for 5-5
Lights
 Alarm battery low 3-5, 5-6
 Amber 3-6
 Continuous 3-6
 Flashing 3-6
 Low agent 3-5
 No output 2-9, 3-5, 5-7
 Operational 3-3, 3-5, 3-8
 Red 3-6
 Test 5-2
 Warm-up 3-5, 3-7
Liquid capacity 9-3
Lock lever 3-4
Locking lever 4-6, 4-8
 Locking vaporizer onto manifold 4-8
 Unlocking vaporizer from manifold 4-12

M

Magnetic Resonance Imaging 2-4
Manifold 4-7
Manifold port valve O-ring 4-5, 4-7
Manifold port valves 4-7
Mercury, use in Tilt switch 2-4
Monitors
 Agent volume 2-8
 Pressure balance 2-8
Mounting
 Checking for correct mounting 4-10

Mounting procedure 4-5

N

No output 3-10

O

Operating humidity range 9-3
Operating temperature range 9-3
Output alarm, testing 5-7
Oxygen monitoring 5-10

P

Power consumption 9-2
Power cord 2-7
 Installing 4-2, 4-4
 Routing 4-2, 4-7, 4-9
Power cord channel 4-4
Power cord retaining plate 4-4
Power failure 3-10
Power supply unit 2-6
Preoperative checkout 5-5
Principle of operation 7-1
 Alarm and indicator display 7-2
 Delivery of gas/agent vapor 7-2

R

Refill mark 3-5
Removing the vaporizer from
a manifold 4-11

S

- Saf-T-Fill™ 5-14
- Saf-T-Fill™ valve 2-6
- Scale 9-3
- Schematic, vaporizer 7-3
- Selectatec™ Series Manifold 2-2, 4-5, 4-6
- Sensors 2-1, 2-8
- Servicing policy 11-2
- Setup procedure 4-2
- Short-wave therapy equipment 2-4
- Spare parts 6-7
- Specifications
 - Classification 9-4
 - Effects of ambient temperature 9-7
 - Effects of back pressure 9-7
 - Effects of carrier gas composition 9-8
 - Effects of output at varied altitudes 9-7
 - Flow characteristics 9-6
 - Performance 9-3
 - Weight and dimensions 9-5
- Standards 2-2, 2-4, 5-10, 5-13
- Status display 3-7
- Storage atmospheric pressure 9-3
- Storage relative humidity range 9-3
- Storage temperature range 9-3
- Sump 2-8
- Suprane™ 1-3, 2-2, 2-6, 5-13, 5-14
 - Refrigeration 5-13
- Symbols 1-4

T

- Temperature variations 9-7
- Tilt switch 2-9
- Troubleshooting
 - Alarm battery low alarm 8-3
 - Continuous warm-up light 8-4
 - Low agent alarm 8-3
 - No output alarm 8-2
 - No output and low agent alarm 8-3
- Troubleshooting guide 8-2

V

- Vaporizer
 - Placement in manifold 4-7
- Visual signals 3-6
- Voltage requirement 9-2

W

- Warm-up cycle 5-14
- Warm-up mode 3-7
- Warranty 10-2
- Weight 9-5
- Width 9-5



Corporate Office



Datex-Ohmeda Division
Instrumentarium Corp.
PO Box 900
FIN-00031 Helsinki
Finland
Tel 358 10 394 11
Fax 358 9 146 3310

North America

United States

Customer Service and Distribution Center

Datex-Ohmeda, Inc.
Ohmeda Drive PO Box 7550
Madison, WI 53707-7550, USA
Tel 1 800 345 2700
Fax 1 608 221 4384

Technical Support

Datex-Ohmeda, Inc.
Three Highwood Drive
Tewksbury, MA 01876, USA
Tel 1 800 345 2755

Sales and Service

Datex-Ohmeda, Inc.
Three Highwood Drive
Tewksbury, MA 01876, USA
Tel 1 800 635 6099
Fax 1 978 640 0469

Equipment Service Center

Datex-Ohmeda, Inc.
1315 West Century Drive
Louisville CO 80027-9560, USA
Tel 1 800 345 2755

Canada

Datex-Ohmeda (Canada) Inc.
1093 Meyerside Drive, Unit 2
Mississauga, Ontario
L5T 1J6
Canada
Tel 1 800 268 1472
Tel 1 905 565 8572
Fax 1 905 565 8592

Asia/Pacific

China

Datex-Ohmeda Pte. Ltd.
Room B416, COFCO Plaza
8 Jianguomennei Avenue
Beijing 100005, PR China
Tel 86 10 6526 9773
Fax 86 10 6526 0653

Datex-Ohmeda Pte. Ltd.
Room 1708, Yunlong Mansion
No. 122 Luogu Street
Chengdu 610017, PR China
Tel 86 28 661 4424
Fax 86 28 676 2703

Datex-Ohmeda Pte. Ltd.
403 Huan Shi Dong Road
Room 1602, GIE Tower
Guangzhou, 510095, P R China
Tel 86 20 8732 2521
Fax 86 20 8732 2518

Datex-Ohmeda Pte. Ltd.
Room 2509 Lippo Plaza
No. 222 Huaihai Road (M)
Shanghai 200021, P.R. China
Tel 8621 5382 5657
Fax 8621 5382 1691

Datex-Ohmeda Pte. Ltd.
Room 809, Truroll Plaza
Wusheng Road
Wuhan 430033, P R China
Tel 86 27 8571 2536
Fax 86 27 8571 2655

India

Datex-Ohmeda (India) Pvt. Ltd.
Block EP & GP, Sector V
Plot XI-16, Salt Lake City
Calcutta 700091

India
Tel 91 33 3574002
Fax 91 33 3574001

Indonesia

Datex-Ohmeda Pte. Ltd.
Wisma Namamon Aetna Life 19th Floor
Jln. Jend Sudirman Kav. 45-46 Jakarta
12930, Indonesia
Tel 62 21 575 0864
Fax 62 21 575 0865

Japan

Datex-Ohmeda K. K.
TRC Annex 9F
6-1-1 Heiwajima
Ohta-ku, Tokyo 143-0006

Japan
Tel 81 3 5763 6801
Fax 81 3 5763 6838

Datex-Ohmeda K. K.

Technical Center
TRC A Bldg. AE 4-8
6-1-1 Heiwajima
Ohta-ku, Tokyo 143-0006
Japan
Tel 81 3 5763 6850
Fax 81 3 5763 6852

Korea
Datex-Ohmeda Pte. Ltd.
10th Floor, Sam Sung Building
36 - 1, Yoido-Dong, Youngdeungpo-Ku
Seoul, Korea
Tel 82 2 786 7421
Fax 82 2 786 7420

Malaysia

Datex-Ohmeda Pte. Ltd.
Level 2 Bangunan O'Connor
13 Jalan 223
46100 Petaling Jaya
Selangor, West Malaysia
Tel 60 3 754 7872
Fax 60 3 757 6948

Singapore

Datex-Ohmeda Pte. Ltd.
152 Beach Road
#12-05/07 Gateway East
Singapore 189721
Tel 65 391 8618
Fax 65 291 6618

Thailand

Datex-Ohmeda Pte. Ltd.
12th Floor (Unit F) Grand Amarin Tower
1550 New Petchburi Road, Makasan, Ratchaviri,
Bangkok 10320, Thailand
Tel 66 2 2071012/13
Fax 66 2 207 1014

Taiwan and Philippines

Datex-Ohmeda Pte. Ltd.
2nd Floor, No. 85, Chien-Kuo North Road, Sec. 2
Taipei, Taiwan
Republic of China
Tel 886-2 2515-0457
Fax 886-2 2501-9136

Vietnam

Datex-Ohmeda Pte. Ltd.
522G Nguyen Tri Phuong St.
Ho Chi Minh City, Dist. 10 Vietnam
Tel 848 865 5875
Fax 848 862 5501

Australia

Datex-Ohmeda Pty. Ltd.
Units 1 & 2
149 Arthur Street
P O Box 356
Homebush
NSW 2140
Australia
Tel 61 132 229
Fax 61 297 461796

Europe

France
Datex-Ohmeda S.A.S.
Parc de Pissaloup, BP 10
8 Avenue Jean d'Alembert
F-78191 Trappes-Cédex
France
Tel 33 1 30 68 60 00
Fax 33 1 30 68 60 01

Datex-Ohmeda S.A.S.

17 rue Jean-Elysée Dupuy
F-69410 Champagne Au Mont d'Or
France
Tel 33 1 30 68 60 00
Fax 33 4 78 43 26 58

Germany

Datex-Ohmeda GmbH
Auf der Höhe 49
Gewerbehof 49
D-47059 Duisburg
Germany
Tel 49 2065 691 247
Fax 49 2065 691 255

Italy

Datex-Ohmeda S.p.A.
Via Cassanese 100
20090 Segrate, Milan
Italy
Tel 39 2 21693431
Fax 39 2 26926226

Netherlands

Datex-Ohmeda B.V.
Kantemarsweg 18
Post Box 22
3870 CA Hoevelaken
Netherlands
Tel 31 33 253 5404
Fax 31 33 253 7223

Spain

Datex-Ohmeda S.L.
C/Manuel Tovar 26
28034 Madrid
Spain
Tel 34 1 334 26 00
Fax 34 1 358 12 84

United Kingdom

Datex-Ohmeda Ltd.
Ohmeda House
71 Great North Road
Hatfield Hertfordshire
AL9 5EN England
Tel 44 1707 263570
Fax 44 1707 260191

Latin America, Caribbean

Datex-Ohmeda Latin America
10685 North Kendall Drive
Miami, FL 33176, USA
Tel 1 305 273 9940
Fax 1 305 273 4382

Middle East

Datex-Ohmeda
Middle East Operations
P O Box 5527
Dubai, United Arab Emirates
Tel 97 14 822653
Fax 97 14 822659